INITIAL SUBMITTAL

ROBINSON EXAM 2001-301

MARCH 26 - APRIL 2, 2001

INITIAL SUBMITTAL JPMS

ADMINISTRATIVE JPMs/QUESTIONS
SIMULATOR JPMs,
IN-PLANT JPMs, AND
INITIAL ADMIN TOPICS OUTLINE
(ES-301-1),
CONTROL ROOM SYSTEMS &
FACILITY WALK-THROUGH OUTLINE
(ES-301-2)

Facility: RNP	Date of Examination: 26-Mar-01
Examination Level: SRO-I/U	Operating Test Number:

	Administrative Topic/Subject Description	Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions (KA #)
A.1	CONDUCT OF OPERATIONS	Perform a Manual Shutdown Margin Calculation (FMP-012) (2.1.25)
		Determine Work Time Limits for Heat Stress Conditions (AP-020) (2.1.26)
A.2	EQUIPMENT CONTROL	Review / Approve an Equipment Clearance (OPS-NGGC-1301) (2.2.13)
A.3	RADIATION CONTROL	Review / Approve a Liquid Waste Release Permit (EMP-023) (2.3.6)
A.4	EMERGENCY PLAN	Classify an Event and Determine Protective Action Recommendations (EAL-1 / EAL-2 / EPCLA-01) (2.4.41 / 2.4.44)

Facility: **RNP**	Date of Examination: **26-Mar-01**
Examination Level: **RO**	Operating Test Number:

	Administrative Topic/Subject Description	Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions (KA #)
A.1	CONDUCT OF OPERATIONS	Perform a Manual Shutdown Margin Calculation (FMP-012) (2.1.25)
		Perform Seal Injection Flow Determination (OP-301-1) (2.1.19)
A.2	EQUIPMENT CONTROL	Determine Clearance Requirements (OPS-NGGC-1301) (2.2.13)
A.3	RADIATION CONTROL	Take Actions to Limit Radiation Exposure in Response to Radiation Alarm (AOP-005) (2.3.10)
A.4	EMERGENCY PLAN	Activate the ERDS from the Control Room (EPCLA-01) (2.4.43)

Facility:	RNP	Date of Examination:	26-Mar-01
Examination Level:	SRO-U	Operating Test Number:	

B.1 Control Room Systems

	System/JPM Title	Type Code*	Safety Function (KA #)
a.	Depressurize the RCS Following a SGTR (PATH-2)	DASL	3 (038EA1.09)
b.	Shift Operating CCW Pumps (OP-306)	NAS	8 (008A4.01)
c.	Restore Normal Power Following a Loss of Off-Site Power (OP-603)	DSL	6 (062A4.07)
d.			
e.			
f.			
g.			

B.2 Facility Walk-Through

	System/JPM Title	Type Code*	Safety Function (KA #)
a.	Perform Emergency Refill of IVSW Tank Using Service Water (OP-911)	DR	5 (069AA1.03)
b.	Lineup the Deepwell Pumps as Backup to AFW System (OP-402)	D	4S (061A1.04)
c.			

*Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (C)ontrol Room, (S)imulator, (L)ow-Power, (R)CA

Facility:	RNP	Date of Examination:	26-Mar-01
Examination Level:	RO	Operating Test Number:	

B.1 Control Room Systems

	System/JPM Title	Type Code*	Safety Function (KA #)
a.	Depressurize the RCS Following a SGTR (PATH-2)	DASL	3 (038EA1.09)
b.	Shift Operating CCW Pumps (OP-306)	NAS	8 (008A4.01)
c.	Lineup the RHR System for SI Standby (GP-002)	DSL	4P (005A4.01)
d.	Perform Rod Control Exercise and Rod Position Indication Surveillance (OST-011)	NAS	1 (001A4.03)
e.	Manually Initiate Containment Spray (PATH-1)	DASL	5 (011EA1.04)
f.	Perform NIS Comparator Channel Surveillance (OST-007)	NS	7 (015A4.02)
g.	Transfer to Long Term Recirculation (EPP-10)	DASL	2 (006A4.05)

B.2 Facility Walk-Through

	System/JPM Title	Type Code*	Safety Function (KA #)
a.	Perform Emergency Refill of IVSW Tank Using Service Water (OP-911)	DR	5 (069AA1.03)
b.	Lineup the Deepwell Pumps as Backup to AFW System (OP-402)	D	4S (061A1.04)
c.	Remove the Halon Suppression System from Service (OP-804)	D	8 (086A4.06)

*Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (C)ontrol Room, (S)imulator, (L)ow-Power, (R)CA

Facility:	**RNP**	Date of Examination:	**26-Mar-01**
Examination Level:	**SRO-I**	Operating Test Number:	

B.1 Control Room Systems

System/JPM Title	Type Code*	Safety Function (KA #)
a. Depressurize the RCS Following a SGTR (PATH-2)	DASL	3 (038EA1.09)
b. Shift Operating CCW Pumps (OP-306)	NAS	8 (008A4.01)
c. Restore Normal Power Following a Loss of Off-Site Power (OP-603)	DSL	6 (062A4.07)
d. Perform Emergency Boration (EPP-4)	MASL	1 (004A4.18)
e. Manually Initiate Containment Spray (PATH-1)	DASL	5 (011EA1.04)
f. Perform NIS Comparator Channel Surveillance (OST-007)	NS	7 (015A4.02)
g. Transfer to Long Term Recirculation (EPP-10)	DASL	2 (006A4.05)

B.2 Facility Walk-Through

a. Perform Emergency Refill of IVSW Tank Using Service Water (OP-911)	DR	5 (069AA1.03)
b. Lineup the Deepwell Pumps as Backup to AFW System (OP-402)	D	4S (061A1.04)
c. Remove the Halon Suppression System from Service (OP-804)	D	8 (086A4.06)

*Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (C)ontrol Room, (S)imulator, (L)ow-Power, (R)CA

INITIAL SUBMITTAL

ROBINSON EXAM 2001-301

MARCH 26 - APRIL 2, 2001

INITIAL SUBMITTAL

INITIAL OUTLINE SUBMITTALS
NRC SUBMITTED/WRITTEN OUTLINES

Facility: **RNP**		Date of Exam: **26-Mar-01**										Exam Level: **SRO**
Tier	Group	K/A Category Points										Point Total
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	
1 Emergency & Abnormal Plant Evolutions	1	2	2	3				2	11			4	24
	2	2	1	3				1	7			2	16
	3	1	0	1				0	0			1	3
	Tier Totals	5	3	7				3	18			7	43
2 Plant Systems	1	1	1	2	2	1	1	2	4	0	2	3	19
	2	1	2	2	2	2	1	1	2	1	2	1	17
	3	1	0	0	1	0	1	0	0	1	0	0	4
	Tier Totals	3	3	4	5	3	3	3	6	2	4	4	40
3 Generic Knowledge and Abilities			Cat 1: 5		Cat 2: 4		Cat 3: 3		Cat 4: 5			17

Notes:

1 Ensure that at least two topics from every K/A category are sampled within each tier (i.e., the "Tier Totals" in each K/A category shall not be less than two).

2 Actual point totals must match those specified in the table.

3 Select topics from many systems; avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities.

4 Systems/evolutions within each group are identified on the associated outline.

5 The shaded areas are not applicable to the category/tier.

6* The generic K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system.

7 On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings for the SRO license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant-specific priorities. Enter the tier totals for each category in the table above.

8 Shaded K/As on the following pages indicate that the related questions appear ONLY on the SRO examination.

Emergency and Abnormal Plant Evolutions - Tier 1/Group 1

E/APE # / Name / Safety Function	E/AK1	E/AK2	E/AK3	E/AA1	E/AA2	G	K/A Topic(s)	Imp.	Points
000001 Continuous Rod Withdrawal / 1					3		Actions taken if automatic functions have not taken place	4.8	1
000003 Dropped Control Rod / 1						2.4.4	Entry-level for abnormal operating procedures (Dropped Rod)	4.3	1
000005 Inoperable/Stuck Control Rod / 1			3				Tech-Spec limits for rod mismatch	4.1	1
					3		Actions if more than one rod stuck / inoperable	4.4	1
000011 Large Break LOCA / 3 **(PSA)**					11		Conditions for throttling HPI	4.3	1
W/E04 LOCA Outside Containment / 3									
W/EO1 & E02 Rediagnosis & SI Termination / 3					2		(Rediagnosis) Adherence to procedures	3.9	1
000015/17 RCP Malfunctions / 4				20			RCP malfunctions: Bearing temperature	2.7	1
W/E09&E10 Natural Circ. / 4			1				(Nat Circ) Facility operating characteristics	3.6	1
000024 Emergency Boration / 1				5			Performance of letdown system during emergency boration	3.2	1
000026 Loss of Component Cooling Water / 8					4		Limits for temps of components cooled by CCW	2.9	1
000029 Anticipated Transient w/o Scram / 1					1		ATWS: Reactor nuclear instrumentation	4.7	1
000040 (W/E12) Steam Line Rupture - Excessive Heat Transfer / 4	2						(Uncont Depress all SGs) Emergency operating procedures	3.8	1
W/E08 RCS Overcooling - PTS / 4			3				(PTS) Desired operating results during emergency situations	3.8	1
					2		(PTS) Adherence to appropriate procedures	4.1	1
000051 Loss of Condenser Vacuum / 4					2		Conditions requiring reactor and/or turbine trip	4.1	1
000055 Station Blackout / 6						2.4.16	EOP hierarchy / coordination (Station Blackout)	4.0	1
000057 Loss of Vital AC Elec. Inst. Bus / 6					20		Interlocks to restore normal equipment operation	3.9	1
000059 Accidental Liquid RadWaste Rel. / 9		2					Radioactive-gas monitors	2.7	1
000062 Loss of Nuclear Service Water / 4						2.4.24	Loss of cooling water procedures (SW)	3.7	1
000067 Plant Fire On-site / 9					4		Fire's extent of potential damage to equipment	4.3	1
000068 Control Room Evac / 8						2.4.11	Abnormal condition procedures (Cont Room Evac)	3.6	1
000069 (W/E14) Loss of CTMT Integrity / 5	2						(High Cont Press) Emergency operating procedures	3.7	1
000074 (W/E06&E07) Inad. Core Cooling / 4		2					(Core Cooling) Facility's heat removal and operation	4.1	1
000076 High Reactor Coolant Activity / 9					2		Actions for high fission product activity in RCS	3.4	1
K/A Category Totals:	2	2	3	2	11	4	Group Point Total:		24

ES-401	PWR SRO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 2	Form ES-401-3

E/APE # / Name / Safety Function	E/AK1	E/AK2	E/AK3	E/AA1	E/AA2	G	K/A Topic(s)	Imp.	Points
000007 Reactor Trip - Stabilization - Recovery / 1			1				Actions contained in EOP for reactor trip	4.6	1
000008 Pressurizer Vapor Space Accident / 3									
000009 Small Break LOCA / 3									
W/E03 LOCA Cooldown - Depress. / 4 **(PSA)**				2			(LOCA CD/Depress) Operating behavior characteristics	3.9	1
W/E11 Loss of Emergency Coolant Recirc. / 4 **(PSA)**		2					Facility's heat removal systems and proper operation	4.3	2
					2		(Loss of Recirc) Adherence to procedures	4.2	
000022 Loss of Reactor Coolant Makeup / 2									
000025 Loss of RHR System / 4	1						Implications of loss of RHRS during all modes	4.3	1
						2.1.25	Interpret station reference materials (Loss of RHR)	3.1	1
000027 Pressurizer Pressure Control System					4		Tech-Spec limits for RCS pressure	4.3	1
000032 Loss of Source Range NI / 7					1		Normal/abnormal power supply operation	2.9	1
000033 Loss of Intermediate Range NI / 7					11		Loss of compensating voltage	3.4	1
000037 Steam Generator Tube Leak / 3					16		Pressure to maintain RCS during S/G cooldown	4.3	1
000038 Steam Generator Tube Rupture / 3						2.4.4	Entry-level conditions for EOPs (SGTR)	4.3	1
000054 Loss of Main Feedwater / 4 **(PSA)**	1						MFW line break depressurizes S/G (similar to steam break)	4.3	1
W/E05 Inadequate Heat Transfer - Loss of					1		(Loss of Heat Sink) Selection of procedures	4.4	1
000058 Loss of DC Power / 6			1				Use of dc control power by D/Gs	3.7	1
000060 Accidental Gaseous Radwaste Rel. / 9									
000061 ARM System Alarms / 7			2				Guidance contained in alarm response for ARM system	3.6	1
W/E16 High Containment Radiation / 9									
000065 Loss of Instrument Air / 8					6		When to trip reactor if inst air press decreasing	4.2	1
K/A Category Totals:	2	1	3	1	7	2	Group Point Total:		16

Emergency and Abnormal Plant Evolutions - Tier 1/Group 3

E/APE # / Name / Safety Function	E/AK1	E/AK2	E/AK3	E/AA1	E/AA2	G	K/A Topic(s)	Imp.	Points
000028 Pressurizer Level Malfunction / 2	1						PZR reference leak abnormalities	3.1	1
000036 Fuel Handling Accident / 8						2.2.28	Fuel movement procedures (Fuel Handling Accident)	3.5	1
000056 Loss of Off-site Power / 6									
W/E13 Steam Generator Over-pressure / 4									
W/E15 Containment Flooding / 5			1				(Cont Flooding) Coolant chemistry and effects	2.9	1
K/A Category Totals:	1	0	1	0	0	1	Group Point Total:		3

ES-401	PWR SRO Examination Outline Plant Systems - Tier 2/Group 1	Form ES-401-3

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
001 Control Rod Drive								12				Consequences of erroneous ECP calculation	4.2	2
			1									Effect of loss/malfunction of CRDS on CVCS	3.0	
003 Reactor Coolant Pump								5				Effects of VCT pressure on RCP seal leakoff flows	2.8	1
004 Chemical and Volume Control										4		Calculation of boron concentration changes	3.6	2
							11					CVCS controls: Letdown and charging flows	3.0	
013 Engineered Safety Features Actuation										3		Operate/monitor: ESFAS initiation	4.7	2
		1										Power supplies to ESFAS/safeguards equipment	3.8	
014 Rod Position Indication								4				Consequences of misaligned rod	3.9	1
015 Nuclear Instrumentation						4						NIS: Bistables and logic circuits	3.2	1
017 In-core Temperature Monitor				1								Input to subcooling monitors	3.7	1
022 Containment Cooling			2									Effect of loss of CCS on cont instruments	3.3	1
026 Containment Spray							1					CSS controls: Containment pressure	4.2	1
056 Condensate	3											Relationships between Condensate and MFW	2.6	1
059 Main Feedwater				19								Automatic feedwater isolation	3.4	1
061 Auxiliary/Emergency Feedwater **(PSA)**											2.1.12	Apply tech specs (AFW)	4.0	1
063 DC Electrical Distribution											2.1.32	System limits and precautions (DC Electrical)	3.8	1
068 Liquid Radwaste											2.3.11	Radiation releases (Liquid Radwaste)	3.2	1
071 Waste Gas Disposal								5				WGDS: Power failure to ARM and PRM	2.6	1
072 Area Radiation Monitoring					2							Radiation intensity changes with source distance	3.2	1
K/A Category Totals:	1	1	2	2	1	1	2	4	0	2	3	Group Point Total:		19

ES-401 PWR SRO Examination Outline Form ES-401-3

Plant Systems - Tier 2/Group 2

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
002 Reactor Coolant					10							Relationship between reactor power and RCS diff temp	4.1	1
006 Emergency Core Cooling								12				Conditions requiring ECCS actuations	4.8	1
010 Pressurizer Pressure Control											2.1.33	Entry-level conditions for tech specs (Pressurizer Pressure)	4.0	1
011 Pressurizer Level Control						4						Effect on operation of PZR level controllers	3.1	1
012 Reactor Protection		1										Power supplies to RPS channels, components	3.3	1
016 Non-nuclear Instrumentation			1									Effect of loss of NNIS on RCS	3.6	1
027 Containment Iodine Removal														
028 Hydrogen Recombiner and Purge Control							2					HRPS controls: Containment pressure	3.7	1
029 Containment Purge														
033 Spent Fuel Pool Cooling			3									Effect of loss on spent fuel temperature	3.3	1
034 Fuel Handling Equipment														
035 Steam Generator				1								S/GS feature(s) providing for S/G level control	3.8	1
039 Main and Reheat Steam					8							Effect of steam removal on reactivity	3.6	1
055 Condenser Air Removal														
062 AC Electrical Distribution		1										Power supplies to major system loads	3.4	1
064 Emergency Diesel Generator										2		Adjustment of exciter voltage	3.4	1
073 Process Radiation Monitoring										1		Operate/monitor: Effluent release	3.9	1
075 Circulating Water								2				Consequences of loss of CW pumps	2.7	1
079 Station Air	1											Relationship between SAS and IAS	3.1	1
086 Fire Protection									1			Starting mechanisms of fire water pumps	3.3	1
103 Containment				6								Containment isolation system	3.7	1
K/A Category Totals:	1	2	2	2	2	1	1	2	1	2	1	Group Point Total:		17

Plant Systems - Tier 2/Group 3

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
005 Residual Heat Removal														
007 Pressurizer Relief/Quench Tank									1			Components which discharge to the PRT	2.9	1
008 Component Cooling Water				2								CCWS: Operation of surge tank	3.7	1
041 Steam Dump/Turbine Bypass Control						3						SDS: Controller and positioners	2.9	1
045 Main Turbine Generator	18											Relationships between MT/G system and RPS	3.7	1
076 Service Water														
078 Instrument Air														
K/A Category Totals:	1	0	0	1	0	1	0	0	1	0	0	Group Point Total:		4

Plant-Specific Priorities

System/Topic	Recommended Replacement for …	Reason	Points
Plant-Specific Priority Total: (limit 10)			

Facility: **RNP**	Date of Exam: **26-Mar-01**		Exam Level: **SRO**	
Category	K/A #	Topic	Imp.	Points
Conduct of Operations	2.1.1	Conduct of operations requirements	3.8	1
	2.1.3	Shift turnover practices	3.4	1
	2.1.33	Entry-level conditions for technical specifications	4.0	1
	2.1.29	Conduct and verify valve lineups	3.3	1
	2.1.34	Maintain primary and secondary plant chemistry within limits	2.9	1
	Total			5
Equipment Control	2.2.11	Process for controlling temporary changes	3.4	1
	2.2.13	Tagging and clearance procedures	3.8	1
	2.2.18	Process for managing maintenance activities during shutdown operations	3.6	1
	2.2.26	Refueling administrative requirements	3.7	1
	Total			4
Radiation Control	2.3.2	Facility ALARA program	2.9	1
	2.3.1	10 CFR:20 and related facility radiation control requirements	3.0	1
	2.3.4	Radiation exposure limits and contamination control, including permissible levels in excess of those authorized	3.1	1
	Total			3
Emergency Procedures/ Plan	2.4.16	EOP implementation hierarchy and coordination with other support procedures.	4.0	1
	2.4.26	Facility protection requirements including fire brigade	3.3	1
	2.4.43	Emergency communications systems and techniques	3.5	1
	2.4.45	Interpret significance of each annunciator or alarm	3.6	1
	2.4.30	Events related to system operations/status which should be reported to outside agencies	3.6	1
	Total			5
Tier 3 Point Total				17

Facility: **RNP**		Date of Exam: **26-Mar-01**							Exam Level: **RO**			
Tier	Group	K/A Category Points										Point Total
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	
1 Emergency & Abnormal Plant Evolutions	1	2	2	3				3	3			3	16
	2	2	2	4				3	4			2	17
	3	1	0	1				0	0			1	3
	Tier Totals	5	4	8				6	7			6	36
2 Plant Systems	1	2	2	2	2	2	2	2	3	2	2	2	23
	2	1	2	2	2	2	2	1	2	2	2	2	20
	3	1	1	1	2	0	1	1	0	1	0	0	8
	Tier Totals	4	5	5	6	4	5	4	5	5	4	4	51
3 Generic Knowledge and Abilities				Cat 1		Cat 2		Cat 3		Cat 4		13
				4		3		2		4		

Notes:

1. Ensure that at least two topics from every K/A category are sampled within each tier (i.e., the "Tier Totals" in each K/A category shall not be less than two).
2. Actual point totals must match those specified in the table.
3. Select topics from many systems; avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities.
4. Systems/evolutions within each group are identified on the associated outline.
5. The shaded areas are not applicable to the category/tier.

6* The generic K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system.

7. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings for the RO license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant-specific priorities. Enter the tier totals for each category in the table above.
8. Shaded K/As on the following pages indicate that the related questions appear ONLY on the RO examination.

ES-401	PWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1	Form ES-401-4

	E/AK1	E/AK2	E/AK3	E/AA1	E/AA2	G	K/A Topic(s)	Imp.	Points
000005 Inoperable/Stuck Control Rod / 1			3				Tech-Spec limits for rod mismatch	3.6	1
000015/17 RCP Malfunctions / 4				20			RCP malfunctions: Bearing temperature	2.7	1
W/E09&E10 Natural Circ. / 4			1				(Nat Circ) Facility operating characteristics	3.3	1
000024 Emergency Boration / 1				5			Performance of letdown system during emergency boration	3.1	1
000026 Loss of Component Cooling Water / 8				5			CCWS radiation alarm	3.1	1
000027 Pressurizer Pressure Control System Malfunction / 3		3					Pressurizer Pressure controllers and positioners	2.6	1
000040 (W/E12) Steam Line Rupture - Excessive Heat Transfer / 4	2						(Uncont Depress all SGs) Emergency operating procedures	3.5	1
W/E08 RCS Overcooling - PTS / 4			3				(PTS) Desired operating results during emergency situations	3.7	1
000051 Loss of Condenser Vacuum / 4					2		Conditions requiring reactor and/or turbine trip	3.9	1
000055 Station Blackout / 6						2.4.1	EOP entry conditions (Station Blackout)	4.3	1
000057 Loss of Vital AC Elec. Inst. Bus / 6					20		Interlocks to restore normal equipment operation	3.6	1
000062 Loss of Nuclear Service Water / 4						2.4.24	Loss of cooling water procedures (SW)	3.3	1
000067 Plant Fire On-site / 9					4		Fire's extent of potential damage to equipment	3.1	1
000068 Control Room Evac. / 8						2.4.11	Abnormal condition procedures (Cont Room Evac)	3.4	1
000069 (W/E14) Loss of CTMT Integrity / 5	2						(High Cont Press) Emergency operating procedures	3.2	1
000074 (W/E06&E07) Inad. Core Cooling / 4		2					(Core Cooling) Facility's heat removal and operation	3.8	1
000076 High Reactor Coolant Activity / 9									
K/A Category Totals:	2	2	3	3	3	3	Group Point Total:		16

Emergency and Abnormal Plant Evolutions - Tier 1/Group 2

	E/AK1	E/AK2	E/AK3	E/AA1	E/AA2	G	K/A Topic(s)	Imp.	Points
000001 Continuous Rod Withdrawal / 1					3		Actions taken if automatic functions have not taken place	4.5	1
000003 Dropped Control Rod / 1						2.4.4	Entry-level for abnormal operating procedures (Dropped Rod)	4.0	1
000007 Reactor Trip - Stabilization - Recovery / 1			1				Actions contained in EOP for reactor trip	4.0	1
000008 Pressurizer Vapor Space Accident / 3									
000009 Small Break LOCA / 3									
000011 Large Break LOCA / 3 **(PSA)**						2.4.17	EOP terms and definitions (LBLOCA)	3.1	1
W/E04 LOCA Outside Containment / 3									
W/E03 LOCA Cooldown/Depress. / 4 **(PSA)**				2			(LOCA CD/Depress) Operating behavior characteristics	3.7	1
W/E11 Loss of Emergency Coolant Recirc. / 4 **(PSA)**		2					Facility's heat removal systems and proper operation	3.9	1
W/E01 & E02 Rediagnosis & SI Termination / 3			2				(SI Termination) EOP implementation	3.3	1
000022 Loss of Reactor Coolant Makeup / 2									
000025 Loss of RHR System / 4	1						Implications of loss of RHRS during all modes	3.9	1
000029 Anticipated Transient w/o Scram / 1					1		ATWS: Reactor nuclear instrumentation	4.4	1
000032 Loss of Source Range NI / 7									
000033 Loss of Intermediate Range NI / 7					11		Loss of compensating voltage	3.1	1
000037 Steam Generator Tube Leak / 3				11			SG Tube Leak: PZR level indicator	3.4	1
000038 Steam Generator Tube Rupture / 3				30			SGTR: SI and containment isolation	4.0	1
000054 Loss of Main Feedwater / 4 **(PSA)**	1						MFW line break depressurizes S/G (similar to steam break)	4.1	1
W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4 **(PSA)**					2		(Loss of Heat Sink) Adherence to procedures	3.7	1
000058 Loss of DC Power / 6			1				Use of dc control power by D/Gs	3.4	1
000059 Accidental Liquid RadWaste Rel. / 9		2					Radioactive-gas monitors	2.7	1
000060 Accidental Gaseous Radwaste Rel. / 9									
000061 ARM System Alarms / 7			2				Guidance contained in alarm response for ARM system	3.4	1
W/E16 High Containment Radiation / 9									
K/A Category Totals:	2	2	4	3	4	2	Group Point Total:		17

ES-401	PWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 3	Form ES-401-4

	E/AK1	E/AK2	E/AK3	E/AA1	E/AA2	G	K/A Topic(s)	Imp.	Points
000028 Pressurizer Level Malfunction / 2	1						PZR reference leak abnormalities	2.8	1
000036 Fuel Handling Accident / 8						2.2.28	Fuel movement procedures (Fuel Handling Accident)	2.6	1
000056 Loss of Off-site Power / 6									
000065 Loss of Instrument Air / 8									
W/E13 Steam Generator Over-pressure / 4									
W/E15 Containment Flooding / 5			1				(Cont Flooding) Coolant chemistry and effects	2.7	1
K/A Category Totals:	1	0	1	0	0	1	Group Point Total:		3

Plant Systems - Tier 2/Group 1

	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
001 Control Rod Drive						11						CRDS reset system, rod control annunciator	2.9	3
							6					Operating CRDS controls: Reactor power	4.1	
			1									Effect of loss/malfunction of CRDS on CVCS	2.9	
003 Reactor Coolant Pump											2.1.32	Limits and precautions (RCP)	3.4	2
								5				Effects of VCT pressure on RCP seal leakoff flows	2.5	
004 Chemical and Volume Control										4		Calculation of boron concentration changes	3.2	3
		3										Power supplies to charging pumps	3.3	
							11					CVCS controls: Letdown and charging flows	3.0	
013 Engineered Safety Features Actuation								2				Consequences of excess steam demand	4.3	3
										3		Operate/monitor: ESFAS initiation	4.5	
		1										Power supplies to ESFAS/safeguards equipment	3.6	
015 Nuclear Instrumentation					4							Factors affecting accuracy of calorimetrics	2.6	2
						4						NIS: Bistables and logic circuits	3.1	
017 In-core Temperature Monitor				1								Input to subcooling monitors	3.4	1
022 Containment Cooling									1			Initiation of safeguards mode of operation	4.1	2
			2									Effect of loss of CCS on cont instruments	3.0	
056 Condensate	3											Relationships between Condensate and MFW	2.6	1
059 Main Feedwater				19								Automatic feedwater isolation	3.2	1
061 Auxiliary/Emergency Feedwater									3			AFW S/G level control on automatic start	3.9	2
(PSA)	7											AFW: Emergency water source	3.6	
068 Liquid Radwaste											2.3.11	Radiation releases (Liquid Radwaste)	2.7	1
071 Waste Gas Disposal								5				WGDS: Power failure to ARM and PRM	2.5	1
072 Area Radiation Monitoring					2							Radiation intensity changes with source distance	2.5	1
K/A Category Totals:	2	2	2	2	2	2	2	3	2	2	2	Group Point Total:		23

Plant Systems - Tier 2/Group 2

	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
002 Reactor Coolant					10							Relationship between reactor power and RCS diff temp	3.6	1
006 Emergency Core Cooling									6			Automatic operation of valve lineups	3.9	1
010 Pressurizer Pressure Control											2.1.33	Entry-level conditions for tech specs (Pressurizer Pressure)	3.4	1
011 Pressurizer Level Control						4						Effect on operation of PZR level controllers	3.1	1
012 Reactor Protection						4						RPS: Bypass-block circuits	2.9	2
		1										Power supplies to RPS channels, components	3.3	
014 Rod Position Indication								4				Consequences of misaligned rod	3.4	1
016 Non-nuclear Instrumentation			1									Effect of loss of NNIS on RCS	3.4	1
026 Containment Spray							1					CSS controls: Containment pressure	3.9	1
029 Containment Purge				3								Automatic purge isolation	3.2	1
033 Spent Fuel Pool Cooling			3									Effect of loss on spent fuel temperature	3.0	1
035 Steam Generator				1								S/GS feature(s) providing for S/G level control	3.6	1
039 Main and Reheat Steam					8							Effect of steam removal on reactivity	3.6	1
062 AC Electrical Distribution		1										Power supplies to major system loads	3.3	1
063 DC Electrical Distribution											2.1.32	System limits and precautions (DC Electrical)	3.4	1
064 Emergency Diesel Generator										2		Adjustment of exciter voltage	3.3	1
073 Process Radiation Monitoring										1		Operate/monitor: Effluent release	3.9	1
075 Circulating Water								2				Consequences of loss of CW pumps	2.5	1
079 Station Air	1											Relationship between SAS and IAS	3.0	1
086 Fire Protection									1			Starting mechanisms of fire water pumps	2.9	1
K/A Category Totals:	1	2	2	2	2	2	1	2	2	2	2	Group Point Total:		20

Plant Systems - Tier 2/Group 3

	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
005 Residual Heat Removal			1									Effect of loss of RHRS on RCS	3.9	1
007 Pressurizer Relief/Quench Tank									1			Components which discharge to the PRT	2.7	1
008 Component Cooling Water				2								CCWS: Operation of surge tank	2.9	1
027 Containment Iodine Removal														
028 Hydrogen Recombiner and Purge Control							2					HRPS controls: Containment pressure	3.4	1
034 Fuel Handling Equipment														
041 Steam Dump/Turbine Bypass Control						3						SDS: Controller and positioners	2.7	1
045 Main Turbine Generator	18											Relationships between MT/G system and RPS	3.6	1
076 Service Water		1										Power supplies to service water	2.7	1
078 Instrument Air														
103 Containment				6								Containment isolation system	3.1	1
K/A Category Totals:	1	1	1	2	0	1	1	0	1	0	0	Group Point Total:		8

Plant-Specific Priorities

System/Topic	Recommended Replacement for ...	Reason	Points
Plant-Specific Priority Total: (limit 10)			

Facility: **RNP** Date of Exam: **26-Mar-01** Exam Level: **RO**

Category	K/A #	Topic	Imp.	Points
Conduct of Operations	2.1.1	Conduct of operations requirements	3.7	1
	2.1.3	Shift turnover practices	3.0	1
	2.1.29	Conduct and verify valve lineups	3.4	1
	2.1.18	Make accurate, clear and concise logs, records, status boards, and reports	2.9	1
	Total			4
Equipment Control	2.2.11	Process for controlling temporary changes	2.5	1
	2.2.13	Tagging and clearance procedures	3.6	1
	2.2.26	Refueling administrative requirements	2.5	1
	Total			3
Radiation Control	2.3.2	Facility ALARA program	2.5	1
	2.3.1	10 CFR:20 and related facility radiation control requirements	2.6	1
	Total			2
Emergency Procedures/ Plan	2.4.22	Prioritizing safety functions during emergency operations	3.0	1
	2.4.26	Facility protection requirements including fire brigade	2.9	1
	2.4.43	Emergency communications systems and techniques	2.8	1
	2.4.45	Interpret significance of each annunciator or alarm	3.3	1
	Total			4
Tier 3 Point Total				13

INITIAL SUBMITTAL

ROBINSON EXAM 2001-301

MARCH 26 - APRIL 2, 2001

INITIAL SUBMITTAL

OPERATING TEST
SIMULATOR SCENARIOS

Facility: **RNP** Scenario Number: **1** Op-Test Number: ______

Examiners ______ ______ ______

Operators ______ ______ ______

Objectives: To evaluate the candidate's ability to perform a plant shutdown from 100% power. To evaluate the candidates' ability to respond to a failure of the selected first stage pressure transmitter and a trip of a HDP, requiring a power reduction to < 85% power. During the power reduction, the candidates will be evaluated on their ability to control reactivity. The candidates will be evaluated on their ability to respond to a pressurizer pressure transmitter failure and a charging pump trip. A sequence of events will result in a loss of heat sink event coincident with an ATWS. Post-trip complications will include a failure of one PORV to open when feed and bleed initiated.

Initial Conditions: IC-13, 100% power MOL; Equipment OOS is AFW Pump 'A' and SI Pump 'A'. SI Pump 'B' is aligned to Train 'A'.

Turnover: Power is 100% at MOL.

AFW Pump 'A' has been out of service for 4 hours to allow maintenance to investigate a vibration problem identified during the last pump surveillance. Technical Specification 3.7.4 has been entered and 164 hours remain before a shutdown to Mode 3 would be required.

SI Pump 'A' has been out of service for 26 hours due to a motor problem. SI Pump 'B' is aligned to Train 'A' in accordance with OP-202.

Boron concentration is 791 ppm. Bank D rods are at 218 steps.

Shift orders are to commence a power power reduction for a mid-cycle maintenance outage and be prepared to perfom a reactor shutdown within the next 8 hours.

Event Number	Malfunction Number (1)	Event Type*	Event Description
1	NA	BOP(N) SRO(N)	Commence Plant Power Reduction
		RO(R) SRO(R)	Reactivity Control During Power Reduction

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

(1) See Attachment, "Simulator Setup & Actions Required for Scenario," for details on setup.

Event Number	Malfunction Number	Event Type*	Event Description
2	ICOR PT:446 0 180 Asls	BOP(I) SRO(I)	Selected First Stage Pressure Transmitter (446) Failure Low
3	IMF CFW12A	BOP(C) SRO(C)	Heater Drain Pump 'A' Trip
	NA	RO(R) SRO(R)	Reactivity Control During Response to Heater Drain Pump Trip
4	ICOR PT:444 2500 180 Asls	RO(I) SRO(I)	Controlling Channel of Pressurizer Pressure (444) Failure High
5	IMF CVC05A	RO(C) SRO(C)	Charging Pump 'A' Trip
6	IMF CFW24 5e+06 5:00 Asls	RO(M) BOP(M) SRO(M)	Loss of Main Feedwater due to Feed Header Break
	IMF EPS05B IMF EDG03B	RO(M) BOP(M) SRO(M)	Fault on 480V Bus E2 with Lockout of EDG
	IMF CFW01C	RO(M) BOP(M) SRO(M)	Overspeed Trip of SDAFW Pump
7	IMF RPS01A 2 3 IMF RPS01B 2 3	RO(M) BOP(M) SRO(M)	Failure of Reactor to Trip from Control Room
8	IMF PRS03C	RO(C) SRO(C)	Failure of PRZ PORV (446) to Open
9	NA	SRO	Classify the Event

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor
(1) See Attachment, "Simulator Setup & Actions Required for Scenario," for details on setup.

Facility: **RNP** Scenario Number: **2** Op-Test Number: ________

Examiners

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Operators

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Objectives: To evaluate the candidates' ability to perform a plant startup at BOL. To evaluate the candidates' ability to respond to a controlling channel of SG level failure and a T-ref channel failure, resulting in improper rod motion. To evaluate the candidates' response to trip of a service water pump and a failure of the letdown pressure controller. The candidates will be evaluated on their response to a SGTR. Post-trip response will be evaluated on the candidates' ability to address a failed open SG safety valve on the ruptured SG.

Initial Conditions: IC-3. 13% power BOL; Equipment out of service is CCW Pump 'A'.

Turnover: 13% power, BOL.

Equipment out-of-service is CCW Pump 'A' for breaker overhaul. Pump is expected to be returned to service within 8 hours.

Boron concentration is 1517 ppm. Bank D rods are at 106 steps.

Shift orders are to continue the plant startup to 30% power. GP-005 has been completed through Step 8.4.29.

Event Number	Malfunction Number (1)	Event Type*	Event Description
1	NA	BOP(N) SRO(N)	Continued Plant Startup
		RO(R) SRO(R)	Control of Reactivity During Plant Startup
2	ICOR LT:476 0 0 Asls	BOP(I) SRO(I)	Controlling Channel of SG 'A' Level Failure Low

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor
(1) See Attachment, "Simulator Setup & Actions Required for Scenario," for details on setup.

Event Number	Malfunction Number	Event Type*	Event Description
3	IMF CRF08 547 0	RO(I) SRO(I)	Failure Low of T-ref Input to Rod Control
4	IMF SWS01B	BOP(C) SRO(C)	Service Water Pump Trip
5	IMF CVC07 1 300	RO(C) SRO(C)	Letdown Pressure Control Valve Controller Failure
6	IMF SGN02E 750 600	RO(M) BOP(M) SRO(M)	Steam Generator 'B' Tube Rupture at 750 gpm
7	IMF SGN01F 80 0	BOP(C) SRO(C)	Failed Open SG Safety Valve on Ruptured SG 'B'
8	NA	SRO	Classify the Event

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor
(1) See Attachment, "Simulator Setup & Actions Required for Scenario," for details on setup.

Facility: **RNP** Scenario Number: **3 (Spare)** Op-Test Number: ____

Examiners ____ ____ ____

Operators ____ ____ ____

Objectives: To evaluate the candidates' ability to raise power and control reactivity. To evaluate the candidates' ability to respond to a condensate pump trip, requiring a power reduction. To evaluate the candidates' ability to respond to a failure of a controlling channel of pressurizer level, a SG level channel failure, and unwarranted control rod motion. To evaluate the candidates' response to a steamline break inside containment. Post-trip complications will include a failure of both trains of Phase 'B' to actuate and a failure of the MSIVs to automatically close.

Initial Conditions: IC-20; 50% power EOL; Equipment OOS is RHR Pump 'A'.

Turnover: Power is 50% at EOL.

RHR Pump 'A' was taken out of service 2 hours ago for oil replacement due to contaminants and is expected to be returned to service within the next 2 hours. Technical Specification 3.5.2 has been entered and 70 hours remain before a plant shutdown is required.

Boron concentration is 269 ppm. Bank D rods are at 171 steps.

Shift orders are to continue raising power and restore RHR Pump 'A' to service when it becomes available. GP-005, Step 8.5.14, has been completed.

Event Number	Malfunction Number (1)	Event Type*	Event Description
1	NA	BOP(N) SRO(N)	Continued Power Increase
		RO(R) SRO(R)	Control of Reactivity During Power Increase
2	IMF CFW09A	BOP(C) SRO(C)	Condensate Pump Trip and Power Reduction
	NA	RO(R) SRO(R)	Control of Reactivity During Power Reduction

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

(1) See Attachment, "Simulator Setup & Actions Required for Scenario," for details on setup.

Event Number	Malfunction Number	Event Type*	Event Description
3	ICOR LT:459 100 0 Asls	RO(I) SRO(I)	Controlling Channel of Pressurizer Level Failure High
4	ICOR CFW FT:497 0 0 Asls	BOP(I) SRO(I)	Controlling Channel of Feed Flow Failure Low on SG 'B'
5	IMF CRF06A	RO(C) SRO(C)	Unwarranted Automatic Rod Motion
6	IMF MSS01B 8e+06 30 Asls	RO(M) BOP(M) SRO(M)	Steam Line Break Inside Containment on SG 'B'
	IMF MSS03A 2 IMF MSS03B 2 IMF MSS03C 2	BOP(C) SRO(C)	Main Steam Isolation Valves Fail to Automatically Close
7	IMF CNM05A 3 IMF CNM05B 3 IMF CNM05C 3 IMF CNM05D 3 IMF CNM05E 3 IMF CNM05F 3	RO(C) SRO(C)	Phase 'B' Containment Isolation Fails to Automatically Actuate
8	NA		Classify the Event

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor
(1) See Attachment, "Simulator Setup & Actions Required for Scenario," for details on setup.

Facility: **RNP** Scenario Number: **4 (Spare)** Op-Test Number: ______

Examiners

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Operators

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Objectives: To evaluate the candidates' ability to conduct a plant shutdown from 20% power and respond to a failure of a Unit Aux Transformer breaker to open. To evaluate the candidates' ability to respond to a VCT level transmitter failure, a SG PORV pressure transmitter failure, and a trip of a CCW pump with a failure of the standby pump to automatically start. To evaluate the candidate's implementation of emergency operating procedures in response to a small break loss of coolant accident. Post-trip evaluation will determine the candidates' ability to respond to a failure of a single reactor trip breaker to open from the control room and a failure of the main turbine to automatically trip.

Initial Conditions: IC-14. 20% power MOL. The Rod Control System is in MANUAL and equipment OOS is SW Booster Pump 'A'.

Turnover: 20% power, MOL with a plant shutdown in progress.

SW Booster Pump 'A' was taken out of service 3 hours ago for oil replacement due to contaminants and is expected to be returned to service within the next 2 hours. Technical Specification 3.6.6 has been entered and 165 hours remain before a plant shutdown is required.

Rod Control is in MANUAL due to troubleshooting activities with automatic control.

Boron concentration is 1145 ppm. Bank D rods are at 179 steps.

Shift orders are to continue the plant shutdown to Mode 3. Restore SW Booster Pump 'A' to service when maintenance completes work. GP-006, Step 8.2.11, has been completed.

Event Number	Malfunction Number (1)	Event Type*	Event Description
1	NA	BOP(N) SRO(N)	Continue Plant Shutdown
		RO(R) SRO(R)	Control of Reactivity During Plant Shutdown

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

(1) See Attachment, "Simulator Setup & Actions Required for Scenario," for details on setup.

Event Number	Malfunction Number	Event Type*	Event Description
2	TBD	BOP(C) SRO(C)	Unit Aux Transformer Breaker Fails to Automatically Open During Power Transfer
3	ICOR LT:112 (NONE 0 0) 100 0 Asls	RO(I) SRO(I)	VCT Level Channel Failure High
4	IMF CCW01C (NONE 0 0) ICOR PC:611 (NONE 0 0) Asls 0 Asls	RO(C) SRO(C)	CCW Pump Trip with Failure of Standby Pump to Auto Start
5	ICOR PT:497 (NONE 0 0) 100 0 Asls	BOP(I) SRO(I)	SG PORV Pressure Transmitter Failure High
6	IMF RCS09E (NONE 0 0) 800 600 Asls	RO(M) BOP(M) SRO(M)	Small Break Loss of Coolant Accident
7	IMF RPS01B (NONE 0 0) 2 3 Asls	RO(C) SRO(C)	Single Reactor Trip Breaker Fails to Open
8	IMF TUR02C (NONE 0 0)	BOP(C) SRO(C)	Main Turbine Fails to Automatically Trip
9	NA	SRO	Classify the Event

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor
(1) See Attachment, “Simulator Setup & Actions Required for Scenario,” for details on setup.

Section	Contents		Section	Contents
A	RO Section B Outlines		M	A.2
B	B.1.c		N	A.3
C	B.1.d		O	A.4
D	SRO Section A Outlines		PQ	Scenario #1
E	A.1.1		R	Scenario #2
F	A.1.2		S	Scenario #3
G	A.2		T	Electronic Copies
H	A.3		UV	
IJ	A.4		W	
K	RO Section A Outlines		XYZ	
L	A.1.2			

CHANGES TO H.B. ROBINSON NRC EXAMINATION OUTLINES FOLLOWING INITIAL SUBMITTAL

Written Outline Changes

1. Corrected spacing on Senior Reactor Operator, Tier 1 Group 2, to show full listing of "W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4 **(PSA)**," to match Reactor Operator, Tier 1 Group 2 listing for same KA.

Admin JPM Outline Changes

1. Revised JPM RO-A.2 slightly to reflect actual job performance by the operators. Similar, but with different requirements, to JPM SRO-A.2.

JPM Outline Changes

1. Changed Common JPM COM-B.1.a from "Direct" to "Modified." Although Robinson JPM listed this as an Alternate Path JPM, it was not considered to be Alternate Path as initially developed in exam bank. Change affects the Reactor Operator, Senior Reactor Operator (I), and Senior Reactor Operator (U) exams.

2. Selected different KA (027AA1.01 replaces 00038EA2.09) for Common JPM COM-B.1.a. Newly selected KA is a better match for the task. Change affects the Reactor Operator, Senior Reactor Operator (I), and Senior Reactor Operator (U) exams.

3. Changed JPM COM-B.1.b from Alternate Path to non-Alternate Path. NRC requested only 4 JPMs be performed as Alternate Path. Change affects the Reactor Operator, Senior Reactor Operator (I), and Senior Reactor Operator (U) exams.

4. Due to changing JPM COM-B.1.b from Alternate Path to non-Alternate Path, Senior Reactor Operator (U) exam no longer contained 2 Alternate Path JPMs as required. Deleted JPM SRO-B.1.c from Senior Reactor Operator (U) exam due to being non-Alternate Path and replaced with JPM SRO-B.1.d which is Alternate Path. Total number of Alternate Path JPMs for Senior Reactor Operator (U) exam restored to 2.

5. Changed Title of Reactor Operator JPM RO-B.1.c to "Depressurize the RHR System in Preparation for SI Alignment," and changed from "Direct" to "New." The originally selected Robinson JPM did not have any critical steps, i.e. all steps were verifications. Change affects the Reactor Operator exam only.

6. Selected different KA (001A2.11 replaces 001A4.03) for Common JPM RO-B.1.d. Newly selected KA is a better match for the task. Change affects the Reactor Operator, exam only.

Scenario Outline Changes

1. Scenarios #1, #2, and #3 (Spare) – Added initial conditions of a small SG tube leak on SG 'A'. Added initial conditions of SG 'B' steam line radiation monitor out-of-service. Added initial conditions that severe thunderstorms have been reported.

2. Scenario #1 – Changed initial instructions to reduce power to 75% instead of Hot Shutdown.

3. Scenario #2 – Replaced Rod Control System failure for Reactor Operator instrument failure to failure of VCT Level Control instrument. Validation indicated that likelihood of Rod Control System being in AUTO control extremely small, rendering effect of original malfunction to be of inadequate value for evaluation

4. Scenario #2 – Added malfunction for 35 gpm SG tube leak prior to initiation of large SGTR to allow performance of AOP-035.

5. Scenario #3 (Spare) – Changed the Failed Feed Flow transmitter on SG 'B' to Channel 487. Originally had Channel 497 listed, which is on SG 'C'.

6. Scenario #3 (Spare) – Added failure to cause MSIV Check valve on SG 'B' to stick open. MSIV failures already in this scenario have no consequence without this additional failure.

Facility: **RNP**		Date of Examination: **26-Mar-01**
Examination Level: **RO**		Operating Test Number:

	Administrative Topic/Subject Description	Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions (KA #)
A.1	CONDUCT OF OPERATIONS	Perform a Manual Shutdown Margin Calculation (FMP-012) (2.1.25)
		Perform an RCP Seal Injection Flow Determination (OP-301-1) (2.1.19)
A.2	EQUIPMENT CONTROL	Review an Equipment Clearance (OPS-NGGC-1301) (2.2.13)
A.3	RADIATION CONTROL	Take Actions to Limit Radiation Exposure in Response to Radiation Alarm (AOP-005) (2.3.10)
A.4	EMERGENCY PLAN	Activate the Emergency Response Data System from the Control Room (EPCLA-01) (2.4.43)

Facility:	RNP	Date of Examination:	26-Mar-01
Examination Level:	SRO-I/U	Operating Test Number:	

	Administrative Topic/Subject Description	Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions (KA #)
A.1	CONDUCT OF OPERATIONS	Perform a Manual Shutdown Margin Calculation (FMP-012) (2.1.25)
		Determine Work Time Limits for Heat Stress Conditions (AP-020) (2.1.26)
A.2	EQUIPMENT CONTROL	Review / Approve an Equipment Clearance (OPS-NGGC-1301) (2.2.13)
A.3	RADIATION CONTROL	Review / Approve a Liquid Waste Release Permit (EMP-023) (2.3.6)
A.4	EMERGENCY PLAN	Perform an Emergency Action Level Classification and Recommend Protective Actions (EAL-1 / EPCLA-01) (2.4.41 / 2.4.44)

Facility: **RNP**	Date of Examination: **26-Mar-01**
Examination Level: **RO**	Operating Test Number:

B.1 Control Room Systems

	System/JPM Title	Type Code*	Safety Function (KA #)
a.	Depressurize the RCS Following a SGTR (PATH-2)	MASL	3 (027AA1.01)
b.	Shift Operating CCW Pumps (OP-306)	NS	8 (008A4.01)
c.	Depressurize the RHR System in Preparation for SI Alignment (GP-002)	NSL	4P (005A4.01)
d.	Perform Rod Control Exercise and Rod Position Indication Surveillance (OST-011)	NAS	1 (001A2.11)
e.	Manually Initiate Containment Spray (PATH-1)	DASL	5 (011EA1.04)
f.	Perform NIS Comparator Channel Surveillance (OST-007)	NS	7 (015A4.02)
g.	Transfer to Long Term Recirculation (EPP-10)	DASL	2 (006A4.05)

B.2 Facility Walk-Through

	System/JPM Title	Type Code*	Safety Function (KA #)
a.	Perform Emergency Refill of IVSW Tank Using Service Water (OP-911)	DR	5 (069AA1.03)
b.	Lineup the Deepwell Pumps as Backup to AFW System (OP-402)	D	4S (061A1.04)
c.	Remove the Halon Suppression System from Service (OP-804)	D	8 (086A4.06)

*Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (C)ontrol Room, (S)imulator, (L)ow-Power, (R)CA

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM RO-B.1.c

Depressurize the RHR System in Preparation for SI Alignment (GP-002)

CANDIDATE: ________________________________

EXAMINER: ________________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task: Depressurize the RHR System in Preparation for SI Alignment (GP-002)

Alternate Path: NONE

Facility JPM #: NEW

K/A Rating: 005A4.01 Importance: SRO NA RO 3.6

K/A Statement: Ability to manually operate and/or monitor in the control room: Controls and indication for RHR pumps

Task Standard: GP-002, Step 8.4.7, is complete with CCW isolated to the RHR HXs.

Preferred Evaluation Location: Simulator X In Plant ________

Preferred Evaluation Method: Perform X Simulate ________

References: GP-002, Cold Shutdown to Hot Subcritical at No Load T_{avg}

Validation Time: 30 minutes Time Critical: NO

Candidate: ______________________________

Time Start: __________ Time Finish: _______

Performance Time: _______ minutes

Performance Rating: SAT _______ UNSAT _______

Comments: ______________________________

____

Examiner: ______________________________ Date: _______
Signature

Tools/Equipment/Procedures Needed:

GP-002.

SIMULATOR OPERATOR INSTRUCTIONS: See next page for simulator setup instructions.

READ TO OPERATOR

DIRECTION TO CANDIDATE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

The plant is being heated up from Mode 5 to Mode 3 in accordance with GP-002, "Cold Shutdown to Hot Subcritical at No Load Tavg."

Actions are being taken to cool down and depressurize the RHR system per Step 8.4.7.

RHR HX Outlet Temperatures, as read on TR-604, are both < 100 °F.

INITIATING CUES:

You are to complete the depressurization of the RHR system in preparation for SI alignment, commencing with Step 8.4.7.4.

SIMULATOR SETUP INSTRUCTIONS

1) Reset simulator to IC-208.
2) Verify GP-002, Step 8.4.5 conditions are met.
3) Perform GP-002, Step 8.4.6, to transfer letdown from RHR to normal letdown.
4) Place FC-605, RHR HX BYPASS FLOW, in manual and close FCV-605.
5) Adjust HIC-758, RHR HX DISCH FLOW to between 20% and 25% demand.
6) Insert OVR XAOD083C to 95 °F to cause TR-604, Pens 1 and 3, to indicate < 100 °F.
7) Ensure RHR Pump 'A' is operating.
8) Ensure Audio Count Rate is audible.
9) FREEZE the simulator.

START TIME: ________

STEP 1: Locates proper procedure and required information. STANDARD: Locates GP-002, Section 8.4.7, Step 8.4.7.4 NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 2: Stop the RHR Pumps AND verify both RHR pump room ventilation units are STOPPED (**Step 8.4.7.4**) STANDARD: Stops RHR Pump 'A' by placing the switch to STOP and verify pump stops by breaker, pressure, and flow indication Verifies RHR pump room ventilation units are stopped by breaker indication NOTES: **CRITICAL STEP TO ALLOW RHR SYSTEM DEPRESSURIZATION.** ***NOTE: Only critical to stop RHR pump. Verification of fans are not considered critical.*** COMMENTS:	**CRITICAL STEP** ____ SAT ____ UNSAT

STEP 3:	Close RHR-750, LOOP 2 HOT LEG TO RHR SYSTEM (**Step 8.4.7.5.a**)	***CRITICAL STEP**
STANDARD:	Places switch for RHR-750 to CLOSE position and verifies valve closes by position indication	
NOTES:	**CRITICAL TO ISOLATE RHR FROM RCS TO ALLOW DEPRESSURIZATION.** ***NOTE: Either Step 3 or 4 is critical, but not both.***	____ SAT
COMMENTS:		____ UNSAT
STEP 4:	Close RHR-751, LOOP 2 HOT LEG TO RHR SYSTEM (**Step 8.4.7.5.b**)	***CRITICAL STEP**
STANDARD:	Places switch for RHR-751 to CLOSE position and verifies valve closes by position indication	
NOTES:	**CRITICAL TO ISOLATE RHR FROM RCS TO ALLOW DEPRESSURIZATION.** ***NOTE: Either Step 3 or 4 is critical, but not both.***	____ SAT
COMMENTS:		____ UNSAT

STEP 5:	Open the breaker for RHR-751, LOOP 2 HOT LEG TO RHR SYSTEM, on MCC-6 in CMPT NO. 8M (**Step 8.4.7.5.c**)	
STANDARD:	Directs an operator to open breaker	
	SIMULATOR OPERATOR INSTRUCTIONS: Remove power from RHR-751 by inserting MRF EPS235 to RACK_OUT.	
NOTES:	***CUE: WHEN ACTIONS ARE COMPLETE, INFORM CANDIDATE THAT BREAKER IS RACKED OUT.***	____ SAT
COMMENTS:		____ UNSAT
STEP 6:	Adjust PC-145, PRESSURE, to increase Letdown pressure to within 25 psig of current RCS Pressure (**Step 8.4.7.6**)	**CRITICAL STEP**
STANDARD:	Adjusts PC-145 to control letdown pressure within 25 psig of RCS pressure	
NOTES:	**CRITICAL TO ALLOW CONTROLLING RCS PRESSURE AT CURRENT VALUE.**	____ SAT
COMMENTS:		____ UNSAT

<table>
<tr><td>STEP 7:

STANDARD:

NOTES:

COMMENTS:</td><td>Adjust HIC-142, PURIFICATION FLOW, to open HCV-142, RHR TO LETDOWN LINE (Step 8.4.7.7)

Opens HCV-142 by adjusting HIC-142 and verifies HCV-142 open

CRITICAL TO ALLOW ESTABLISHING LETDOWN FLOW FROM RHR.</td><td>CRITICAL STEP

____ SAT

____ UNSAT</td></tr>
<tr><td>STEP 8:

STANDARD:

NOTES:

COMMENTS:</td><td>Adjust PC-145 to decrease letdown pressure to greater than 140 psig and less than 210 psig (Step 8.4.7.8)

Adjusts letdown pressure to between 140 psig and 210 psig using PC-145

CRITICAL TO ALLOW PRESSURE DECREASE TO OPEN RWST SUCTION VALVES.</td><td>CRITICAL STEP

____ SAT

____ UNSAT</td></tr>
</table>

STEP 9:	As Letdown increases, adjust PC-145 setting OR isolate letdown orifices to maintain Letdown flow below 120 gpm (**Step 8.4.7.9**)	
STANDARD:	Either adjusts PC-145 or closes letdown orifices by placing switches to CLOSE postion and maintains flow below 120 gpm	
NOTES:	***NOTE: Either method is acceptable provided letdown flow is maintained within limits.***	____ SAT
COMMENTS:		____ UNSAT
STEP 10:	Control Charging pump speed, letdown flow and excess letdown flow to maintain PZR level between 30% and 40% (**Step 8.4.7.10**)	
STANDARD:	Maintains PZR level between 30% and 40% by controlling pump speed using controller, letdown flow using PC-145 or orifice valves, or excess letdown using flow controller	
NOTES:	***NOTES:*** ***1) Any of these methods is acceptable provided PZR level is maintained between 30% and 40%.*** ***2) Not considered critical since high or low pressurizer level will not affect ability to complete RHR alignment.***	____ SAT
COMMENTS:		____ UNSAT

STEP 11:	NOTE: Leaving HCV-142, RHR TO LETDOWN LINE, open until the RHR System is less than 210 psig will allow SI-862A and SI-862B, RWST TO RHR valves, to open (**Note before Step 8.4.7.11**)	
STANDARD:	Acknowledges note	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
STEP 12:	WHEN RHR System pressure is less than 210 psig as indicated on PI-602A and PI-602B, THEN adjust HIC-142, PURIFICATION FLOW, to close HCV-142 (**Step 8.4.7.11**)	
STANDARD:	Closes HCV-142 by adjusting HIC-142 and verifies HCV-142 closed	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 13: Close RHR-760, RHR SYSTEM TO LETDOWN LINE (**Step 8.4.7.12**) STANDARD: Directs Inside AO to CLOSE RHR-760 in CLOSE position ***SIMULATOR OPERATOR INSTRUCTIONS: Insert MRF RHR008 0 0.*** NOTES: ***CUE: AFTER ACTIONS TAKEN, INFORM CANDIDATE THAT RHR-760 IS CLOSED.*** COMMENTS:	____ SAT ____ UNSAT
STEP 14: Adjust HIC-758, RHR HX DISCH FLOW to 0% demand (**Step 8.4.7.13**) STANDARD: Adjusts HIC-758 to 0% demand NOTES: **CRITICAL TO ESTABLISH PROPER SI ALIGNMENT.** COMMENTS:	**CRITICAL STEP** ____ SAT ____ UNSAT

STEP 15:	Open the RWST to RHR Pump Suction Valves AND record time. - SI-862A, RWST TO RHR - SI-862B, RWST TO RHR (**Step 8.4.7.14**)	**CRITICAL STEP**
STANDARD:	Places switches for SI-862A and SI-862B to OPEN position and verifies valves open by position indication.	
NOTES:	**CRITICAL TO ESTABLISH PROPER SI ALIGNMENT.**	____ SAT
COMMENTS:		____ UNSAT
STEP 16:	NOTE: When CCW flow to the RHR Heat Exchangers is isolated, CCW System flow may need to be adjusted to reduce CCW System pressure. (**Note before Step 8.4.7.15**)	
STANDARD:	Acknowledges note	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 17:	Close the Component Cooling Water valves from the RHR Heat Exchanger. - CC-749A, CCW FROM RHR HX - CC-749B, CCW FROM RHR HX (**Step 8.4.7.15**)	**CRITICAL STEP**
STANDARD:	Places switches for CC-749A and CC-749B to CLOSE position and verifies valves closed by position indication.	
NOTES:	**CRITICAL TO ESTABLISH PROPER SI ALIGNMENT.**	____ SAT
COMMENTS:		____ UNSAT
	END OF TASK	

STOP TIME: ________

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

The plant is being heated up from Mode 5 to Mode 3 in accordance with GP-002, "Cold Shutdown to Hot Subcritical at No Load Tavg."

Actions are being taken to cool down and depressurize the RHR system per Step 8.4.7.

RHR HX Outlet Temperatures, as read on TR-604, are both < 100 ^{o}F.

INITIATING CUES:

You are to complete the depressurization of the RHR system in preparation for SI alignment, commencing with Step 8.4.7.4.

CAROLINA POWER & LIGHT COMPANY
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 3
PART 3

GENERAL PROCEDURE

GP-002

COLD SHUTDOWN TO HOT SUBCRITICAL AT NO LOAD T_{avg}

REVISION 82

SUMMARY OF CHANGES
DCF 2000P1607

STEP	REVISION COMMENTS
	ESR 99-00385, P-T Relief on Heatup -Cooldown Curves justified a change to the limitations placed upon heatup and cooldown rates within the GP's. During heatup, a limit of 60F/hr as stated in Tech. Specs. is now used. Previously, lower rates were used below 350F. Various steps throughout the GP were changed to indicate the new rate.
2.173	Added a reference to ESR 99-00385.
8.1.13	Revised to only remove the Control Power Fuses on HVH-2 & 4. This is similar to OP-921 and simpler to perform (OPCF comment).
CAUTION(s) 8.2.10.1, 8.2.19, 8.3.7	Revised the allowable Heatup Rate to 60F/hr IAW ESR 99-00385. The note at step 8.2.10.1 was changed to a caution to be similar with the same type format contained in the remainder of this procedure. This information is actually a caution.
8.2.10.3	Relocated recording the temperature detector to the first substep "a" per reviewer request. This step was originally located as substep "d".
8.2.12	Relocated verification of RCP labyrinth seal DP directly after starting the RCP's to ensure timely action. The previous revision had this step located after performance of the Attachment 10.6 for aligning SGBD.
8.3.10	Added new step to change ERFIS to Mode 4.
NOTE 8.4.9.8	Added a third statement to allow for prestaging hose/sleeving.
8.4.11.3	Added removal of Caution Tags for SI-860A, SI-860B, SI861A & SI-861B. The intent of adding these valves to the Caution Tag list helps further expand the potential flow paths that could drain the RCS. The list has also been placed in a table format.
Section 8.5	8.5.3.2 - Added new step to change ERFIS to Mode 3. 8.5.10.2 - Revised the RCS pressure band to 800 - 900 psig. This is the pressure band for OST-160. The previous revision raised pressure to a band of 900 - 975 psig, then to a band of 950 - 1000 psig. When OST-160 was performed, RCS pressure was unnecessarily reduced back to 800 - 950 IAW the OST. The new band eliminates this problem. OLD step 8.5.12 - Deleted this step due revision of old pressure bands in steps 8.5.10, 8.5.11 and 8.5.12. NOTE 8.5.12 - The note is self explanatory. OLD 8.5.14 - Removed the RCS Activity check at 500F. This was redundant to the current step 8.5.21 which is still performed prior to 500F. 8.5.19- Revised the OST-202 information to clarify conditions requiring SDAFW Pump testing. OLD 8.5.20.2 and OLD step 8.5.22.2 - Deleted checking the seal table room for leakage at these steps. This was not consistent with ALARA. The intent of the original CR 96-00887 is still maintained by checking for leakage at 800 - 950 psig (ie. early detection). If the RCS has been opened for maintenance, then OST-052 will also be performed to check this area for leakage. 8.5.34 - Revised substep #8 to notify the Outside AO to update the Outside AO Logs for the new PORV setpoints. OLD step 8.5.34 - Deleted removal of the Cavity Ladder due to permanent installation of a staircase during RFO-20.

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1.1 To provide instructions for plant heatup from MODE 5 to MODE 3 at 547 °F.

2.0 **REFERENCES**

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2.2 PLP-100, Technical Requirements Manual (TRM)

2.3 OMM-004, Operations Work Procedure

2.4 OMM-001-12, Minimum Equipment List and Shift Relief

2.5 OP-001, Reactor Control and Protection System

2.6 OP-002, Nuclear Instrumentation System

2.7 OP-003, Rod Control and Position Indication

2.8 OP-006, Pressurizer PORV Pneumatic System/LTOPP

2.9 OP-101, Reactor Coolant System and Reactor Coolant Pump Startup and Operation

2.10 OP-104, Pressurizer Operations

2.11 OP-201, Residual Heat Removal System

2.12 OP-202, Safety Injection and Containment Vessel Spray System

2.13 OP-301, Chemical and Volume Control System (CVCS)

2.14 OP-306, Component Cooling Water System

2.15 OP-307, Inadequate Core Cooling Monitor

2.16 OP-308, Post-Accident Monitoring System

2.17 OP-401, Auxiliary Heating System

2.18 OP-402, Auxiliary Feedwater System

2.19 OP-403, Feedwater System

2.20 OP-405, Main and Reheat Steam System

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2.50 OST-007, Nuclear Instrumentation Comparator Channel

2.51 OST-008, Nuclear Instrumentation Startup Rate Channel

2.52 OST-009, Nuclear Instrumentation Audio Count Rate Channel

2.53 OST-021, Daily Surveillances

2.54 OST-051, Reactor Coolant System Leakage Evaluation

2.55 OST-052, RCS Leakage Test and Examination

2.56 OST-054, Core Cooling Monitor Channel Check

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2.61 OST-108-2, Boric Acid Pump "B" Inservice Inspection

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2.101 OST-908, Component Cooling System Component Test

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2.114 FMP-001, Core Operating Limits Report (COLR)

2.115 FMP-012, Manual Determination of Shutdown Margin Boron Concentration

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2.117 MST-003, TAVG and Delta-T Protection Channel Testing

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2.137 RSPO-87-021, Westinghouse Technical Bulletin Number NSD-TB-77-14

2.138 CP-001, Chemistry Monitoring Program

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2.141 SCR 90-031 (RAIL 90-R0415)

2.142 SCR 89-074, HPES 89-011 (Inadvertent Actuation LTOPP)

2.143 PLP-006, Containment Vessel Inspection/Closeout

2.144 ACR 92-226, Boiling in RHR Heat Exchanger

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2.159 ACR 92-325, Pump Starting Limitations

2.160 Westinghouse Memorandum RSPO-94-001 dated 1/4/94 and RSPO-94-002 dated 1/5/94, concerning operation of RCPs with CCW at and below 50 °F

2.161 ACR 94-01276, Steam Line Drain Valves Found Out of Position

2.162 WCAP-14209, Evaluation of the Effects of Insurge/Outsurge Transients on the Integrity of the Pressurizer at H. B. Robinson Unit 2

2.163 ACR 95-00294, Change to HI FLUX AT SHUTDOWN Setpoint Constant

2.164 CR 95-00565, Water Hammer Events and RHR Isolation Event

2.165 CR 95-01581, PNSC Action Item, Engineering Notification of Cooldown Number

2.166 PIC-015, Static Pressure Zero Shift Steam Flow Transmitters

2.167 OST-020, Shiftly Surveillances

2.168 OST-021, Daily Surveillances

2.169 OST-022, Weekly Surveillances

2.170 OST-023, Monthly Surveillances

2.171 CR 96-00887, RNP RO-17 Lessons Learned

2.172 Project 97-00161, IN 96-69 Operator Actions Affecting Reactivity

2.173 ESR 99-00385, P-T Relief on Heatup -Cooldown Curves

3.0 RESPONSIBILITIES

N/A

4.0 PREREQUISITES

4.1 The RCS has been filled and vented IAW GP-001.

4.2 The RHR System is available for core cooling.

5.0 PRECAUTIONS AND LIMITATIONS

5.1 Reactor Coolant System and Residual Heat Removal

5.1.1 At least one RCP or the RHR System shall be in operation for any of the following:

1. Any evolution involving a reduction in the RCS Boron concentration.

2. Any evolution involving chemical additions to the RCS.

5.1.2 Prior to securing an RCP or RHR pump, review ITS LCO 3.4.7, 3.4.6 and 3.4.5 to ensure compliance.

5.1.3 RCS pressure, RCS temperature and RCS heatup and cooldown rates shall be maintained within the limits specified in Figures 3.4.3-1 and 3.4.3-2. (ITS LCO 3.4.3)

5.1.4 The PZR cooldown rate shall not exceed 200°F/Hr. The PZR heatup rate shall not exceed 100°F/Hr. PZR spray shall not be used if the temperature difference between the PZR and the spray fluid is greater than 320°F. (TRMS 3.4)
The PZR Surge Line has been determined to **NOT** be part of the PZR **AND** is not subject to the PZR heatup **OR** cooldown limitations. (WCAP-14209)
The PZR heaters are capable of raising the temperature of the PZR and contents at approximately 55°F/hr. This rate takes into account the small continuous spray flow provided to maintain the PZR liquid homogeneous with the RCS.

5.1.5 When the PZR temperature is less than or equal to 70 °F, the PZR shall not be pressurized to greater than or equal to 500 psig.

5.1.6 When the RHR loop is open to the RCS, the RCS shall not be pressurized above 375 psig as indicated by PI-403, PI-500 **OR** PI-501A. ERFIS may be used for information to aid in monitoring RCS pressure.

5.1.7 PI-403 should be used to monitor RCS pressure, however, PI-500 and PI-501A should be trended to monitor the margin to LTOP setpoint.

5.1.8 Auxiliary spray should be used with care when the RCS is water solid. The potential exists for system overpressurization with water solid conditions.

5.1.9 To avoid overpressurization and actuation of LTOP during heatup, RHR-759A or RHR-759B should be maintained open to provide pressure control through PCV-145. (SCR 89-074, HPES 89-011)

5.1.10 The RHR loop shall **NOT** be removed from service if the RCS is water solid.

5.1.11 When the configuration of the RHR system is changed, such as swapping RHR pumps, the RC group should be notified to ensure Pipe Alley area surveys are performed. (ACR 94-00204)

5.1.12 When CCW flow to the RHR Heat Exchangers is isolated, CCW System flow may need to be adjusted to reduce CCW System pressure. (ACR 94-00199)

5.1.13 To prevent boiling the CCW liquid contained in an RHR HX, CCW flow should not be isolated to an RHR HX when the temperature of the RHR System is greater than 200°F. (ACR 92-226)

5.1.14 Since PZR level instruments are calibrated for hot conditions (except LI-462), PZR level should be maintained between 30% and 40% until RCS temperature is at least 547°F. This will ensure the PZR heaters are covered when the temperature of the water in the PZR is less than the saturation temperature of the water at normal operating temperature and pressure.

5.1.15 Two RHR Pumps should not be run on recirculation simultaneously when aligned in the Core Cooling Mode and forward flow is not established (with the exception of swapping the running pump). (CR 98-01791)

5.1.16 After PZR level has been established between 22.2% and 53.3%, actions shall be taken to ensure thorough mixing following a significant (10 ppm or greater) change in the RCS Boron concentration. These actions include energizing PZR heaters to cause increased spray flow and increasing letdown and charging flow to speed inventory turnover.

5.1.17 Normal spray flow is unlikely or will not occur at all when RCP "C" is stopped and PZR level is less than 30%. Therefore, PZR pressure response may not be as expected. (SCR 90-031)

5.1.18 Spray flow is unlikely or will not occur at all when operating with the following combinations: RCP “A” alone with either spray valve open, RCP “B” alone with PCV-455B open, RCPs “A” and “B” with PCV-455B open, or RCP “C” with PCV-455A open. Operation in any other RCP/Spray valve combination will ensure adequate spray flow.

5.1.19 RHR flow through each RHR HX should be maintained less than 3750 gpm to eliminate concerns with the HX partition plate.

5.2 Reactivity and Shutdown Margin

5.2.1 When the Reactor is subcritical, positive reactivity shall not be added by more than one method at a time. (Exception: Due to the slow insertion rate contributed by Xenon decay, positive reactivity addition by the Operator may be performed during periods of Xenon decay).

5.2.2 Criticality shall be anticipated at any time when the Shutdown Banks or Control Banks are being withdrawn, or when Boron dilution operations are in progress.

5.2.3 If the count rate on either Source Range channel increases by a factor of two or more during any step involving a Boron concentration change, the operation shall be stopped immediately and suspended until a satisfactory evaluation of the situation has been made.

5.3 Shutdown and Control Rod Banks

5.3.1 Shutdown Bank "A" shall be at the fully withdrawn position whenever reactivity is being changed by Boron or Xenon changes, RCS temperature changes, or Control Rods, other than Shutdown Bank "A". The following exceptions to this rule may be applied:

> **NOTE:** The COLR identifies the required Shutdown Margin (SDM) based on plant conditions. The required Boron Concentration can be determined using Powertrax or the Plant Curve Book using the SDM identified in the COLR. If a discrepancy exists between these methods consult the SSO for resolution.

1. The RCS has been borated and confirmed by sampling, to be at least at the Boron Concentration needed to provide the required SDM for MODE 3 and is being maintained at MODE 3. Approval of the Manager - Operations, or his designated alternate, shall be given for Shutdown Bank "A" to be inserted.

2. The RCS has been borated and confirmed by sampling, to be at least at the Boron Concentration needed to provide the required SDM for MODE 5. Approval of the Manager - Operations, or his designated alternate, shall be given for Shutdown Bank "A" to be inserted.

3. If Shutdown Bank "A" cannot be withdrawn, the RCS shall be borated as required above.

5.3.2 Shutdown Bank "A" shall be withdrawn to 225 steps prior to heatup, as stated in Step 5.3.1 above, and Control Banks "A","B","C", and "D", and Shutdown Bank "B", shall be withdrawn to 005 steps **OR** the Reactor Trip Main and Bypass Breakers shall be verified open prior to RCS heatup. This should preclude control rod binding due to thermal expansion.

5.3.3 Substantial increases in RCS suspended solids may be observed following initial RCP starts. Control rod movement with high suspended solids (≥350 ppb) should be avoided during start-ups. Rod motion during periods of normal operations with high suspended solids (≥200 ppb) may result in CRDM misstepping. (RSPO-87-021)

5.3.4 If it is necessary to operate control rods with RCS pressure less than 350 psig, when the operation is started, have someone listen for excessive noise at the Reactor head area. If water is not in the control rod housing, a loud metallic ring will accompany each latch operation. The control rods shall not be operated with excessive noise or with RCS pressure below 50 psig.

5.4 S/Gs and Secondary Plant

5.4.1 The secondary side of the S/Gs shall not be pressurized above 200 psig if the temperature of the vessel is less than 120 °F. (TRMS 3.3)

5.4.2 During secondary Plant warmup, steam should be drawn off slowly and feedwater additions should be regulated carefully to avoid step cooling of the RCS. Steam shall not be admitted to the Main Turbine **OR** Condenser Steam Dump until the RCS average temperature is greater than 400 °F. Steam may be used for warming up the steam lines or for Gland Seal Steam at any RCS average temperature. Steam may be used for the SDAFW Pump when the RCS average temperature is greater than 350 °F.

5.4.3 Whenever possible, the Steam Dump Valves should be used for temperature control instead of Steam Line PORVs. Anytime the PORVS are **NOT** closed as required by OP-923, the Main Steam Attachment of OP-923 shall be performed, and a dedicated operator stationed.

5.4.4 As the S/Gs begin producing steam, various methods may be used to vent steam while controlling RCS temperature. If the MSIVs or Turbine Stop Valves are closed, the Main Steam lines should be blown down thoroughly twice per shift or a small continuous blowdown should be maintained. This should prevent a slug of water from passing through a Steam Line PORV or Steam Line Safety, if one should open.

5.4.5 The MSIV Before and After Seat Drain Root valves have been determined to be Containment Isolation valves. Anytime these valves are **NOT** Locked Closed as required by OP-923, the Main Steam Attachment of OP-923 shall be performed, and a dedicated operator stationed.

5.4.6 Observe the following precautions when making feedwater additions to the S/Gs:

1. The S/G pressures shall be monitored while feeding when isolated to ensure the S/Gs do not overpressurize and lift a Steam Line PORV.

2. Feedwater additions during Hot Shutdown should be initiated as slowly as possible **AND** should not exceed 400 gpm **OR** 0.2×10^6 lbm/hr to minimize the thermal stress cycles on the feedwater nozzles.

3. If any S/G level is below 20% Narrow Range, feedwater flow should be initiated as slowly as possible to minimize thermal shock.

5.4.7 Observe the following precautions regarding the AFW System:

1. Under all normal Plant conditions, the AFW Pump Controllers, FIC-1424, FIC-1425 and FIC-6416, will be in Automatic, unless they are being used for filling S/Gs IAW OP-402.

2. In order to ensure sufficient flow to the S/Gs from the MDAFW AFW Pumps, the Discharge Flow Controllers shall be in Automatic and set as follows:

RCS Temperature	Flow Setpoint
Less than or equal to 350 °F	100 gpm
Greater than 350 °F	325 gpm

3. In order to ensure sufficient flow to the S/Gs from the SDAFW Pump, the Discharge Flow Controller shall be in Automatic and set at 500 gpm when RCS temperature is greater than 350 °F.

5.4.8 The following precautions should help ensure that S/G and Feedwater Chemistry remains within specifications:

1. When possible and Main Condenser vacuum exists, the Main Feedwater Pumps should be used to feed S/Gs. This should provide better oxygen control.

2. If necessary, the AFW Pumps may be used to feed S/Gs until Feedwater Chemistry is within its specified values.

5.5 Source Range Nuclear Instrumentation

5.5.1 Whenever the Source Range channels are energized, the CV evacuation horn shall be operable and a Source Range channel should be continuously recording on the NI recorder, NR-45.

5.5.2 ITS LCO 3.3.1, Table 3.3.1-1 requires that both Source Range instruments be operable in MODEs 3, 4 and 5, whenever Control Rods are not fully inserted or capable of withdrawal.

5.6 General

5.6.1 The principles of **ALARA** shall be used in planning and performing work and operations in the Radiation Control Area.

5.6.2 Prior to Heatup of RCS or PZR, the Reactor Coolant Filter D/P should be checked and the SSO should determine if the filter should be replaced. When the RCS or PZR temperature is being changed, the Reactor Coolant Filter D/P should be monitored to ensure it is replaced prior to exceeding 25 psid. (ACR 94-00126)

5.6.3 Prior to starting any major motors, the starting limitations as stated in the appropriate Operating Procedure shall be followed. This will ensure no motor damage will occur due to motor overheating. (ACR 92-325)

6.0 SPECIAL TOOLS AND EQUIPMENT

N/A

7.0 ACCEPTANCE CRITERIA

N/A

INIT

8.4.6 Transfer letdown flow from RHR to Normal letdown as follows:

1. Adjust HIC-142, PURIFICATION FLOW, to close HCV-142, RHR TO LETDOWN LINE. ____

2. Determine the saturation pressure corresponding to the temperature indicated on TI-140, Regenerative Heat Exchanger outlet. ______ psig ____

3. Adjust PC-145, PRESSURE, to a setpoint below 140 psig and above the pressure recorded above. ____

4. As Letdown increases, adjust PC-145 setting **OR** isolate letdown orifices to maintain Letdown flow below 120 gpm. ____

5. Control Charging pump speed, letdown flow and excess letdown flow to maintain PZR level between 30% and 40%. ____

NOTE: The remainder of this section can be performed concurrently with this step.

RHR-750 and 751 are maintained opened during the cooldown process to allow the RCS to makeup for any contraction in the RHR System during the cooldown process.

8.4.7 Cool down **AND** depressurize the RHR System as follows:

1. Place FC-605, RHR HX BYPASS FLOW, in manual **AND** close FCV-605. ____

2. Adjust HIC-758, RHR HX DISCH FLOW to between 20% and 25% demand. ____

8.4.7 (Continued) INIT

CAUTION

If the starting limitation stated in the Precautions and Limitations Section of OP-201 are exceeded, motor damage can occur due to motor overheating.

NOTE: When an RHR pump is started and it's train ventilation unit is inoperable, the opposite train ventilation can be started by placing the RUN/AUTO switch on the power supply breaker to RUN.

3. Alternately operate RHR Pump "A" and "B" to maintain the outlet temperatures, as read on TR-604 Pens 1 and 3, within 50°F until the temperatures are less than 100°F. (CR 95-00565)

   - TR-604 Pen 1 temperature less than 100°F ________°F ____
   - TR-604 Pen 3 temperature less than 100°F ________°F ____

4. Stop the RHR Pumps **AND** verify both RHR pump room ventilation units are STOPPED.

   - RHR Pump "A" ____
   - RHR Pump "B" ____
   - HVH-8A ____
   - HVH-8B ____

5. Perform the following:

   a. Close RHR-750, LOOP 2 HOT LEG TO RHR SYSTEM. ____

   b. Close RHR-751, LOOP 2 HOT LEG TO RHR SYSTEM. ____

   c. Open the breaker for RHR-751, LOOP 2 HOT LEG TO RHR SYSTEM, on MCC-6 in CMPT NO. 8M. ____

8.4.7 (Continued) INIT VERI

6. Adjust PC-145, PRESSURE, to increase Letdown pressure to within 25 psig of current RCS Pressure. ____

7. Adjust HIC-142, PURIFICATION FLOW, to open HCV-142, RHR TO LETDOWN LINE. ____

8. Adjust PC-145 to decrease letdown pressure to greater than 140 psig and less than 210 psig. ____

9. As Letdown increases, adjust PC-145 setting **OR** isolate letdown orifices to maintain Letdown flow below 120 gpm. ____

10. Control Charging pump speed, letdown flow and excess letdown flow to maintain PZR level between 30% and 40%. ____

NOTE: Leaving HCV-142, RHR TO LETDOWN LINE, open until the RHR System is less than 210 psig will allow SI-862A and SI-862B, RWST TO RHR valves, to open.

11. **WHEN** RHR System pressure is less than 210 psig as indicated on PI-602A and PI-602B, **THEN** adjust HIC-142, PURIFICATION FLOW, to close HCV-142. ____

12. Close RHR-760, RHR SYSTEM TO LETDOWN LINE. (ACR 94-00533) ____ ____

13. Adjust HIC-758, RHR HX DISCH FLOW to 0% demand. ____

14. Open the RWST to RHR Pump Suction Valves **AND** record time.

    - SI-862A, RWST TO RHR ____ ____
    - SI-862B, RWST TO RHR ____ ____

Time ____

8.4.7 (Continued) INIT

NOTE: When CCW flow to the RHR Heat Exchangers is isolated, CCW System flow may need to be adjusted to reduce CCW System pressure. (ACR 94-00199)

15. Close the Component Cooling Water valves from the RHR Heat Exchanger.

    - CC-749A, CCW FROM RHR HX ____

    - CC-749B, CCW FROM RHR HX ____

8.4.8 **WHEN** the Component Cooling Water valves from the RHR Heat Exchangers are closed, **THEN** verify only one CCW Pump is OPERATING. ____

8.4.9 Perform the following to vent the SI and CV Spray pump casings:

1. Remove SI-888D, SI PUMP "A" VENT, cap. ____
2. Remove SI-888E, SI PUMP "A" VENT, cap. ____
3. Remove SI-888J, SI PUMP "B" VENT, cap. ____
4. Remove SI-888K, SI PUMP "B" VENT, cap. ____
5. Remove SI-888N, SI PUMP "C" VENT, cap. ____
6. Remove SI-888W, SI PUMP "C" VENT, cap. ____
7. Remove SI-833B, CV SPRAY PUMP "B" SEAL WATER VENT, cap. ____

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM RO-B.1.d

Perform Rod Control Exercise and Rod Position Indication Surveillance (OST-011)

CANDIDATE: ______________________________

EXAMINER: ______________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task: Perform Rod Control Exercise and Rod Position Indication Surveillance (OST-011)

Alternate Path: Rod drops during withdrawal, requiring reactor trip.

Facility JPM #: NEW

K/A Rating: 001A2.11 Importance: SRO NA RO 4.1

K/A Statement: Ability to (a) predict the impacts of the following malfunction or operations on the CRDS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Situations requiring reactor trip

Task Standard: Reactor has been manually tripped in response to a dropped rod.

Preferred Evaluation Location: Simulator X In Plant ____

Preferred Evaluation Method: Perform X Simulate ____

References: OST-011, Rod Cluster Control Exercise & Rod Position Indication Monthly

Validation Time: 15 minutes Time Critical: NO

Candidate: ____________________

Time Start: ________ Time Finish: ________

Performance Time: ________ minutes

Performance Rating: SAT ________ UNSAT ________

Comments: ____________________

____

Examiner: ____________________ Date: ________

Signature

Tools/Equipment/Procedures Needed:

OST-011

SIMULATOR OPERATOR INSTRUCTIONS:

1) **Reset to IC-20.**
2) **Insert remote function CRF008 to DEFEAT.**
3) **FREEZE the simulator.**
4) **When directed by JPM instructions, insert MFI CRF004 for Rod N-7 to cause the rod to drop.**

READ TO OPERATOR

DIRECTION TO CANDIDATE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

The plant is operating at 50% power

OST-011, "Rod Cluster Control Exercise & Rod Position Indication Monthly." is being performed.

INITIATING CUES:

You are to perform OST-011 commencing with Section 7.1 for Shutdown Bank 'A' rods.

START TIME: ________

STEP 1: Locates proper procedure and required information. STANDARD: Locates OST-011, Section 7.1 NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 2: Record Initial Rod Heights RTGB (Inches), Initial Rod Heights ERFIS (Inches), and Group Counter Initial Height (Steps) on ATTACHMENT 8.1 (**Step 7.1.1**) STANDARD: Records initial rod heights from RTGB, initial rod heights from ERFIS, and group counter initial height on Attachment 8.1 NOTES: COMMENTS:	____ SAT ____ UNSAT

STEP 3:	Position the ROD BANK SELECTOR switch to the SBA position for Shutdown Bank 'A' (**Step 7.1.2**)	**CRITICAL STEP**
STANDARD:	Rotates switch to the SBA position	
NOTES:	**CRITICAL TO ALLOW MOVEMENT OF SHUTDOWN BANK 'A' RODS ONLY.**	____ SAT
COMMENTS:		____ UNSAT
STEP 4:	Using the IN-HOLD-OUT lever, position Shutdown Bank 'A' rods, using step counter indication, to the required number of steps as dictated by plant conditions stated in the Precautions (**Step 7.1.3**)	**CRITICAL STEP**
STANDARD:	Places IN-HOLD-OUT lever to IN position and inserts Shutdown Bank 'A' rods 19 steps	
NOTES:	**CRITICAL TO INSERT RODS REQUIRED AMOUNT TO DEMONSTRATE ACCEPTABLE OPERATION.**	____ SAT
COMMENTS:		____ UNSAT

STEP 5:	Record Tested Rod Heights RTGB (Inches), Tested Rod Heights ERFIS (Inches), AND Group Counter Tested Height (Steps) on ATTACHMENT 8.1 (**Step 7.1.4**)	
STANDARD:	Records Shutdown Bank 'A' Rod Heights RTGB (Inches), Tested Rod Heights ERFIS (Inches), AND Group Counter Tested Height (Steps) on ATTACHMENT 8.1.	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
STEP 6:	Using the IN-HOLD-OUT lever, return rods to the Initial Height (Steps) as indicated by the step counters (**Step 7.1.5**)	**CRITICAL STEP**
STANDARD:	Places IN-HOLD-OUT lever to OUT position and begins withdrawing Shutdown Bank 'A' rods ***SIMULATOR OPERATOR INSTRUCTIONS: Insert MFI CRF004 for Rod N-7 to cause the rod to drop into the core AFTER the candidate either starts the second withdrawal of the rods OR the rods are withdrawn above 219 steps if the candidate performs a continuous withdrawal of the rods.***	
NOTES:	**CRITICAL TO WITHDRAW RODS TO FULLY WITHDRAWN POSITION TO RESTORE REQUIRED ALIGNMENT FOR OPERATIONS.** ***NOTE: Withdrawal shall NOT be the continuous 19 steps per Precaution 4.4.5.***	____ SAT
COMMENTS:		____ UNSAT

STEP 7: Diagnoses a dropped rod in Shutdown Bank 'A' STANDARD: Determines a dropped rod has occurred in Shutdown Bank 'A' by: - Rod height indication on RTGB - Rod height indication on ERFIS - APP-005-E2, ROD CONT SYSTEM URGENT FAILURE, illuminated - APP-005-E3, ROD CONT SYSTEM NON-URGENT FAILURE, illuminated - APP-005-F2, ROD BOTTOM ROD DROP, illuminated NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 8: Stop withdrawing Shutdown Bank 'A' rods STANDARD: Releases IN-HOLD-OUT lever to HOLD position NOTES: COMMENTS:	____ SAT ____ UNSAT

STEP 9:	Informs CRSS of need to trip reactor and initiates a manual reactor trip (**Based on Precaution 4.4.5**)	**CRITICAL STEP**
STANDARD:	Informs CRSS and places reactor trip switch to TRIP position and verifies reactor trip by trip breaker position indication, rod position indication, and plant response	
NOTES:	**CRITICAL TO INITIATE A REACTOR TRIP IN RESPONSE TO DROPPED ROD WITH RODS NOT IN NORMAL ALIGNMENT.** ***NOTE: It is NOT critical to inform CRSS prior to tripping reactor.***	____ SAT
COMMENTS:		____ UNSAT
	END OF TASK	

STOP TIME: ________

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

The plant is operating at 50% power

OST-011, "Rod Cluster Control Exercise & Rod Position Indication Monthly." is being performed.

INITIATING CUES:

You are to perform OST-011 commencing with Section 7.1 for Shutdown Bank 'A' rods.

CP&L

C
Continuous
Use

CAROLINA POWER & LIGHT COMPANY
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 3
PART 9

OPERATIONS SURVEILLANCE TEST

OST-011

ROD CLUSTER CONTROL EXERCISE & ROD POSITION INDICATION MONTHLY INTERVAL

REVISION 17

SUMMARY OF CHANGES

6/18/98

Step No.	Change Made
Cover Sheet	Changed the performance interval to reflect the interval required by ITS SR 3.1.7.2 & 3.1.7.3 and STSS.
2.10	Added new reference for CR 98-01241.
3.3	Reformatted step to place MODE first.
3.6	Added new prerequisite to require the plant be at less than 98% power to prevent possible actuation of bistables.
4.1.1	Added new precaution explaining the reason for ensuring that the plant is less than 98% power during performance of this test. Renumbered remaining steps.
4.4.5	Provided additional guidance to slowly withdraw/insert Control Rods to prevent possible receipt of bistables.
4.4.6	Corrected a typo in the spelling of ERFIS.
4.4.8	Added new precaution regarding pressure decreases and the use of PZR heaters.
6.1.1	Added "or ERFIS" to reflect that the use of ERFIS is acceptable per Precaution 4.4.7 and ITS.
Throughout procedure	Revised the ROD BANK SELECTOR Switch positions in each part of Section 7 to reflect the actual switch nomenclature.

TABLE OF CONTENTS

1.0 PURPOSE

1.1 This test verifies the proper operability of each of the full-length control rod assemblies, the rod drive mechanisms, and the associated control and indicating circuits.

1.2 Performance of this test satisfies the requirements of ITS SR 3.1.4.2, SR 3.1.7.2 and SR 3.1.7.3.

2.0 REFERENCES

2.1 Improved Technical Specification LCO 3.1.4 and LCO 3.1.7

2.2 OST-551, Turbine Valve and Trip Functional Test

2.3 AOP-001, Malfunction of Reactor Control System

2.4 OMM-015, Operations Surveillance Testing

2.5 PLP-037, Conduct of Infrequently Performed Tests or Evolutions

2.6 RSPO-87-021, Westinghouse Technical Bulletin Number NSD-TB-77-14

2.7 SOER 96-1, Control Room Supervision, Operational Decision-Making, and Teamwork

2.8 CR 97-00529, Receipt of Delta Flux Warning During OST-011

2.9 ESR 97-00611, Rod Position Indication Drift

2.10 CR 98-01241, Receipt of OPΔT/OTΔT Turbine Runback/Rod Stop Annunciation During OST-011

3.0 PREREQUISITES

3.1 This revision has been verified to be the latest revision available.

______________________(Print) ______________ __________
Name Signature Date

3.2 The Superintendent Shift Operations has given his permission to conduct this test.

______________________________ __________
Superintendent Shift Operations Date

3.3 This test may be performed during:

Mode 1 (Power Operation) (Reference Section 4.1)

Mode 3 or Mode 4 (Hot Standby or Hot Shutdown) (Reference Section 4.2)

Mode 5 (Cold Shutdown) (Reference Section 4.3)

3.4 If Power Conditions (Mode 1) exist, the controlling rod bank is in the normal operating band and Delta Flux is at least 4% above the bottom of the operating band. (CR 97-00529)

3.5 If Power Conditions (Mode 1) exist and Control Bank "D" is less than 215 steps, this test should be conducted in conjunction with a planned load reduction, such as OST-551, if appropriate.

3.6 If Power Conditions (Mode 1) exist, the plant is at less than 98% power.

3.7 ERFIS is available for obtaining Rod Height data.

4.0 PRECAUTIONS AND LIMITATIONS

4.1 Power Operation

4.1.1 Power should be at less than 98% to prevent possible actuation of OTΔT or OPΔT bistables.

4.1.2 Do not exceed 19 step movement on any non-controlling group Full Length RCCA being tested at power operation (Mode 1) condition.

4.1.3 Each controlling bank Full Length RCCA is to be moved a minimum of 19 steps on the group counters from their initial position and then returned to their original positions. (ITS 3.1.7.2 and SR 3.1.7.3)

4.1.4 If Control Bank "D" is greater than or equal to 215 steps on the group counters, then perform Section 7.6 and N/A Sections 7.7 and 7.8.

4.1.5 If Control Bank "D" is less than 215 steps on the group counters, then perform the applicable Section 7.7 or 7.8, N/A the non-applicable section and Section 7.6.

4.1.6 Each non-controlling Full Length RCCA Bank is to be moved 19 steps on the group counters from the fully withdrawn position and then be returned to original positions.

4.1.7 During power (Mode 1) testing, Reactor Coolant average temperature changes in excess of 4°F are to be compensated for by repositioning the controlling rod bank.

4.1.8 During reduced power (Mode 1) testing, Reactor Coolant average temperature changes in excess of 4°F are to be compensated for by varying Turbine Load when testing the controlling rod bank.

4.1.9 Maintaining Pressurizer heaters energized while performing rod exercises at power will minimize any pressure fluctuations due to the temperature changes.

4.1.10 Ensure Axial Flux Difference (AFD) is maintained within the Target Band for the duration of the test. AFD can shift down as much as 4% during the performance of this OST. (CR 97-00529)

4.1.11 Ensure Load Dispatcher is notified prior to performing Section 7.8.

4.2 Hot Shutdown

4.2.1 Do not exceed 19 step movement on any Full Length Rod Control Assembly being tested at hot shutdown (Mode 3 or Mode 4) condition.

4.2.2 Each Full Length RCCA Bank is to be moved 19 steps on the group counters from the fully withdrawn or fully inserted position and then be returned to original positions.

4.2.3 When testing at zero power (Mode 3 or Mode 4) ensure that proper shutdown margins are being maintained for the existing (Mode) condition.

4.3 Cold Shutdown

4.3.1 Do not exceed 38 step movement on any Full Length Rod Control Assembly being tested at cold shutdown (Mode 5) conditions.

4.3.2 When testing at cold shutdown (Mode 5) ensure all rods are inserted except for selected bank being tested.

4.3.3 In cold shutdown (Mode 5) condition, each Full Length RCCA bank is to be moved 38 steps on the group counters from the fully inserted position and then be returned to the original position.

4.3.4 If it is necessary to operate control rods with RCS pressure less than 350 psig, have someone listen for excessive noise at the Reactor head area when the operation is started. If water is not in the control rod housing, a loud metallic ring will accompany each latch operation. The control rods shall not be operated with excessive noise or with RCS pressure below 50 psig.

4.3.5 Substantial increases in RCS suspended solids may be observed following initial RCP starts. Control rod movement with high suspended solids (greater than or equal to 350 ppb) should be avoided during start-ups. Rod motion during periods of normal operations with high suspended solids (greater than or equal to 200 ppb) may result in CRDM misstepping. (REF RSPO-87-021)

4.4 General

4.4.1 This procedure has been determined to be exempt from PLP-037 requirements.

4.4.2 Any steps not applicable shall be marked N/A and the reason(s) noted in the Comments Section of Attachment 8.2.

4.4.3 AOP-001, Malfunction of Reactor Control System, will govern and initiate any corrective actions for a suspected misaligned control rod.

4.4.4 IF a verified dropped rod or runback occurs while in the individual bank select mode during power operation (Mode 1) AND the RCCA's are not aligned to their normal configuration at the time of the dropped rod or runback, THEN trip the reactor AND go to PATH-1.

4.4.5 All Control Rod movements SHALL be performed in a deliberate carefully controlled manner, while closely monitoring Reactor response. Rods shall not be withdrawn continuously for the entire 19 steps since doing so may result in a rapid increase in T_{ave} and ΔT and actuation of the OTΔT or OPΔT bistables. (SOER 96-1)(CR 98-01241)

4.4.6 ERFIS data may be printed out when rods are moved to the tested heights and recorded following restoration of rods to the normal heights to minimize the time rods are out of the normal position.

4.4.7 The use of ERFIS is an acceptable alternate method for determining ARPI System Operability IAW Improved Tech Specs if the RTGB RPI indicators are not indicating properly. In cases where both indications (RPI and ERFIS) are tracking closely, and one of the indications is outside the required limits with the other indication still within the limits, ERFIS should be considered the most accurate indication and actions taken should be based on the ERFIS indication. If the ERFIS readout is used to replace the RPI indicators, it shall be continuously displayed on a terminal accessible to the Reactor Operator. (ESR 97-00611)

4.4.8 RCS pressure will decrease when inserting Control Rods. Having PZR heaters ON will reduce the effects of the pressure transient.

5.0 **SPECIAL TOOLS AND EQUIPMENT**

None applicable.

6.0 **ACCEPTANCE CRITERIA**

6.1.1 Each rod operates as described in this procedure as indicated on the RTGB instrumentation or ERFIS.

6.1.2 For bank demand positions at or above 200 steps, the individual rod position is acceptable if the rod position indication (RPI) (RTGB and ERFIS) is within ±15 inches of the bank demand position following a movement of the applicable bank greater than or equal to 19 steps. (ITS SR 3.1.7.3).

6.1.3 For bank demand positions below 200 steps, the individual rod position is acceptable if the rod position indication (RPI) (RTGB and ERFIS) is within ±7.5 inches of the average of the rod position indications of the bank following a movement of the applicable bank greater than or equal to 19 steps. (ITS SR 3.1.7.2).

6.1.4 The reviewing and approving authorities may accept this surveillance test in accordance with the provisions set forth in OMM-015, Operations Surveillance Testing.

7.0 **PROCEDURE**

INIT

7.1 Shutdown Bank "A" Rods

7.1.1 Record Initial Rod Heights RTGB (Inches), Initial Rod Heights ERFIS (inches), AND Group Counter Initial Height (Steps) on ATTACHMENT 8.1. ___

7.1.2 Position the ROD BANK SELECTOR switch to the SBA position for Shutdown Bank "A". ___

7.1.3 Using the IN-HOLD-OUT lever, position Shutdown Bank "A" rods, using step counter indication, to the required number of steps as dictated by plant conditions stated in the Precautions. ___

7.1.4 Record Tested Rod Heights RTGB (Inches), Tested Rod Heights ERFIS (Inches), AND Group Counter Tested Height (Steps) on ATTACHMENT 8.1. ___

7.1.5 Using the IN-HOLD-OUT lever, return rods to the Initial Height (Steps) as indicated by the step counters. ___

7.1.6 Record Restored Rod Heights RTGB (Inches), Restored Rod Heights ERFIS (inches), AND Group Counter Restored Height (Steps) on ATTACHMENT 8.1. ___

7.1.7 Verify ERFIS Bank Step Counter Position Indication agrees RTGB Group Counter Restored Height (Steps). ___

7.1.8 Testing Shutdown Bank "A" rods complete. ___

INIT

7.2 Shutdown Bank "B" Rods

7.2.1 Record Initial Rod Heights RTGB (Inches), Initial Rod Heights ERFIS (inches), AND Group Counter Initial Height (Steps) on ATTACHMENT 8.1. ___

7.2.2 Position the ROD BANK SELECTOR switch to the SBB position for Shutdown Bank "B". ___

7.2.3 Using the IN-HOLD-OUT lever, position Shutdown Bank "B" rods, using step counter indication, to the required number of steps as dictated by plant conditions stated in the Precautions. ___

7.2.4 Record Tested Rod Heights RTGB (Inches), Tested Rod Heights ERFIS (Inches), AND Group Counter Tested Height (Steps) on ATTACHMENT 8.1. ___

7.2.5 Using the IN-HOLD-OUT lever, return rods to Initial Height (Steps), as indicated by the step counters. ___

7.2.6 Record Restored Rod Heights RTGB (Inches), Restored Rod Heights ERFIS (inches), AND Group Counter Restored Height (Steps) on ATTACHMENT 8.1. ___

7.2.7 Verify ERFIS Bank Step Counter Position Indication agrees RTGB Group Counter Restored Height (Steps). ___

7.2.8 Testing Shutdown Bank "B" rods complete. ___

INIT

7.3 Control Bank "A" Rods

7.3.1 Record Initial Rod Heights RTGB (Inches), Initial Rod Heights ERFIS (inches), AND Group Counter Initial Height (Steps) on ATTACHMENT 8.1. ___

7.3.2 Position the ROD BANK SELECTOR switch to the CBA position for Control Bank "A". ___

7.3.3 Using the IN-HOLD-OUT lever, position Control Bank "A" rods, using step counter indication, to the required number of steps as dictated by plant conditions stated in the Precautions. ___

7.3.4 Record Tested Rod Heights RTGB (Inches), Tested Rod Heights ERFIS (Inches), AND Group Counter Tested Height (Steps) on ATTACHMENT 8.1. ___

7.3.5 Using the IN-HOLD-OUT lever, return rods to Initial Height (Steps), as indicated by the step counters. ___

7.3.6 Record Restored Rod Heights RTGB (Inches), Restored Rod Heights ERFIS (inches), AND Group Counter Restored Height (Steps) on ATTACHMENT 8.1. ___

7.3.7 Verify ERFIS Bank Step Counter Position Indication agrees RTGB Group Counter Restored Height (Steps). ___

7.3.8 Testing Control Bank "A" rods complete. ___

7.4 Control Bank "B" Rods **INIT**

7.4.1 Record Initial Rod Heights RTGB (Inches), Initial Rod Heights ERFIS (inches), AND Group Counter Initial Height (Steps) on ATTACHMENT 8.1. ____

7.4.2 Position the ROD BANK SELECTOR switch to the CBB position for Control Bank "B". ____

7.4.3 Using the IN-HOLD-OUT lever, position Control Bank "B" rods, using step counter indication, to the required number of steps as dictated by plant conditions stated in the Precautions. ____

7.4.4 Record Tested Rod Heights RTGB (Inches), Tested Rod Heights ERFIS (Inches), AND Group Counter Tested Height (Steps) on ATTACHMENT 8.1. ____

7.4.5 Using the IN-HOLD-OUT lever, return rods to Initial Height (Steps), as indicated by the step counters. ____

7.4.6 Record Restored Rod Heights RTGB (Inches), Restored Rod Heights ERFIS (inches), AND Group Counter Restored Height (Steps) on ATTACHMENT 8.1. ____

7.4.7 Verify ERFIS Bank Step Counter Position Indication agrees RTGB Group Counter Restored Height (Steps). ____

7.4.8 Testing Control Bank "B" rods complete. ____

INIT

7.5 Control Bank "C" Rods

7.5.1 Record Initial Rod Heights RTGB (Inches), Initial Rod Heights ERFIS (inches), AND Group Counter Initial Height (Steps) on ATTACHMENT 8.1. ___

7.5.2 Position the ROD BANK SELECTOR switch to the CBC position for Control Bank “C”. ___

7.5.3 Using the IN-HOLD-OUT lever, position Control Bank "C" rods, using step counter indication, to the required number of steps as dictated by plant conditions stated in the Precautions. ___

7.5.4 Record Tested Rod Heights RTGB (Inches), Tested Rod Heights ERFIS (Inches), AND Group Counter Tested Height (Steps) on ATTACHMENT 8.1. ___

7.5.5 Using the IN-HOLD-OUT lever, return rods to Initial Height (Steps), as indicated by the step counters. ___

7.5.6 Record Restored Rod Heights RTGB (Inches), Restored Rod Heights ERFIS (inches), AND Group Counter Restored Height (Steps) on ATTACHMENT 8.1. ___

7.5.7 Verify ERFIS Bank Step Counter Position Indication agrees RTGB Group Counter Restored Height (Steps). ___

7.5.8 Testing Control Bank "C" rods complete. ___

INIT

NOTE: For performance of Control Bank "D" use one of the following three methods, N/A the sections not used:

Method 1 (Section 7.6) applies:

> At Cold Shutdown (Mode 5)
>
> At Hot Shutdown (Mode 3 and Mode 4)
>
> At Power (Mode 1) with Control Bank "D" greater than or equal to 215 steps on group counter.

Method 2 (Section 7.7) applies:

> At Power (Mode 1) with Control Bank "D" less than 215 steps on the group counters in conjunction with a planned load reduction, such as performance of OST-551, Turbine Valve and Trip Functional Test, or control of weir discharge temperature.

Method 3 (Section 7.8) applies:

> At Power (Mode 1) with Control Bank "D" less than 215 steps on the group counter.

7.6 Control Bank "D" Rods - Method 1

7.6.1 Record Initial Rod Heights RTGB (Inches), Initial Rod Heights ERFIS (inches), AND Group Counter Initial Height (Steps) on ATTACHMENT 8.1. ___

7.6.2 Position the ROD BANK SELECTOR switch to the CBD position for Control Bank "D". ___

7.6.3 Using the IN-HOLD-OUT lever, position Control Bank "D" rods, using step counter indication, to the required number of steps as dictated by plant conditions stated in the Precautions. ___

7.6.4 Record Tested Rod Heights RTGB (Inches), Tested Rod Heights ERFIS (Inches), AND Group Counter Tested Height (Steps) on ATTACHMENT 8.1. ___

7.6.5 Using the IN-HOLD-OUT lever, return rods to Initial Height (Steps), as indicated by the step counters. ___

INIT

7.6.6 Record Restored Rod Heights RTGB (Inches), Restored Rod Heights ERFIS (inches), AND Group Counter Restored Height (Steps) on ATTACHMENT 8.1. ___

7.6.7 Verify ERFIS Bank Step Counter Position Indication agrees RTGB Group Counter Restored Height (Steps). ___

7.6.8 Testing Control Bank "D" rods complete. ___

7.7 Control Bank "D" Rods - Method 2

7.7.1 Record Initial Rod Heights RTGB (Inches), Initial Rod Heights ERFIS (inches), AND Group Counter Initial Height (Steps) on ATTACHMENT 8.1. ___

7.7.2 Perform power reduction according to Plant Procedures. ___

7.7.3 Record Tested Rod Heights RTGB (Inches), Tested Rod Heights ERFIS (Inches), AND Group Counter Tested Height (Steps) on ATTACHMENT 8.1 after a minimum of 19 steps of rod movement as indicated by the group counter. ___

7.7.4 Perform testing, repairs or other tasks which dictated the planned load reduction. ___

7.7.5 Record Restored Rod Heights RTGB (Inches), Restored Rod Heights ERFIS (inches), AND Group Counter Restored Height (Steps) on ATTACHMENT 8.1 when rods are returned to their Initial Height (Steps) as indicated by the group counter. ___

7.7.6 Verify ERFIS Bank Step Counter Position Indication agrees RTGB Group Counter Restored Height (Steps). ___

7.7.7 Testing of Control Bank "D" rods is complete. ___

INIT

7.8 Control Bank "D" Rods - Method 3

7.8.1 Inform the Load Dispatcher that there maybe a swing in load prior to continuing. ___

7.8.2 Record Initial Rod Heights RTGB (Inches), Initial Rod Heights ERFIS (inches), AND Group Counter Initial Height (Steps) on ATTACHMENT 8.1. ___

7.8.3 Position the ROD BANK SELECTOR switch to the CBD position for Control Bank “D”. ___

NOTE: Reactor Coolant average temperature changes in excess of 4°F are to be compensated for by varying Turbine Load in accordance with plant procedures.

7.8.4 Using the IN-HOLD-OUT lever, position Control Bank "D" rods, using step counter indication, to the required number of steps as dictated by plant conditions stated in the Precautions. ___

7.8.5 Record Tested Rod Heights RTGB (Inches), Tested Rod Heights ERFIS (Inches), AND Group Counter Tested Height (Steps) on ATTACHMENT 8.1. ___

7.8.6 Using the IN-HOLD-OUT lever, return rods to Initial Height (Steps), as indicated by the step counters. ___

7.8.7 Record Restored Rod Heights RTGB (Inches), Restored Rod Heights ERFIS (inches), AND Group Counter Restored Height (Steps) on ATTACHMENT 8.1. ___

7.8.8 Verify ERFIS Bank Step Counter Position Indication agrees RTGB Group Counter Restored Height (Steps). ___

7.8.9 IF required, THEN restore Turbine Load to pre-test conditions . ___

7.8.10 Testing and Control Bank "D" Rods is complete. ___

INIT

7.9 System Restoration

7.9.1 When testing of all banks is complete, return ROD BANK SELECTOR switch to desired position for plant conditions. ___

7.10 Alignment Determination

7.10.1 Complete Steps 1 - 10 on ATTACHMENT 8.1 for each rod bank. ___

8.0 ATTACHMENTS

8.1 RCC Exercise and RPI Data Sheet

8.2 Surveillance Test Procedure Certification and Review Form

ATTACHMENT 8.1
Page 1 of 12
RCC EXERCISE AND RPI DATA SHEET

SHUTDOWN **BANK "A" RODS**

STEP NO.	ROD POSITION INDICATION	G3	C9	J13	N7	J3	C7	G13	N9	GROUP COUNTER	1	2
7.1.1	Initial Rod Height RTGB (Inches)									Initial Height		
	Initial Rod Height ERFIS (Inches)									(Steps)		
7.1.4	Tested Rod Height RTGB (Inches)									Tested Height		
	Tested Rod Height ERFIS (Inches)									(Steps)		
7.1.6	Restored Rod Height RTGB (Inches)									Restored Height		
	Restored Rod Height ERFIS (Inches)									(Steps)		
3)	Difference btw Step 7.1.6 Rod Height RTGB and Step 2) below (Inches)											
4)	Difference btw Step 7.1.6 Rod Height ERFIS and Step 2) below (Inches)											
7)	Difference btw Step 7.1.6 Rod Height RTGB and Step 6) below (Inches)											
9)	Difference btw Step 7.1.6 Rod Height ERFIS and Step 8) below (Inches)											

RCC EXERCISE AND RPI DATA SHEET

<u>SHUTDOWN</u> **BANK _____"A"____ RODS**

			INIT
1)	Are the Restored Height Group Counters ≥200 steps? If yes, go to Step 2 and N/A Steps 6, 7, 8, 9 and 10. If no, go to Step 6 and N/A Steps 2, 3, 4, and 5.	Yes No (Circle One)	____
2)	Convert the Restored Height Group Counter indication to inches by: $\frac{\text{Group Counter Ind. x 5 inches}}{8}$	__________ inches	____
3)	Record in the blocks for 3), the difference between each RPI Restored Rod Height RTGB and the value calculated in Step 2).		____
4)	Record in the blocks for 4), the difference between each RPI Restored Rod Height ERFIS and the value calculated in Step 2).		____
5)	Are all the values recorded in the blocks for 3) <u>AND</u> 4) less than or equal to 15 inches? (If no, notify Superintendent Shift Operations.)	Yes No N/A (Circle One)	____
6)	Calculate the average bank position for RTGB indications by adding the individual restored rod height position indications RTGB and dividing by the number of rods in the bank.	__________ (inches)	____
7)	Record in the blocks for 7), the difference between each RPI Restored Rod Height RTGB and the value calculated in Step 6).		____
8)	Record ERFIS Shutdown Bank "A" group average position.	__________ (inches)	____
9)	Record in the blocks for 9), the difference between each RPI Restored Rod Height ERFIS and the value calculated in Step 8).		____
10)	Are all the values recorded in the blocks for 7) <u>AND</u> 9) less than or equal to 7.5 inches? (If no, notify Superintendent Shift Operations.)	Yes No N/A (Circle One)	____

RCC EXERCISE AND RPI DATA SHEET

SHUTDOWN **BANK "B" RODS**

STEP NO.	ROD POSITION INDICATION	E5	E11	L11	L5	H6	F8	H10	K8	GROUP COUNTER	1	2
7.2.1	Initial Rod Height RTGB (Inches)									Initial Height (Steps)		
	Initial Rod Height ERFIS (Inches)											
7.2.4	Tested Rod Height RTGB (Inches)									Tested Height (Steps)		
	Tested Rod Height ERFIS (Inches)											
7.2.6	Restored Rod Height RTGB (Inches)									Restored Height (Steps)		
	Restored Rod Height ERFIS (Inches)											
3)	Difference btw Step 7.2.6 Rod Height RTGB and Step 2) below (Inches)											
4)	Difference btw Step 7.2.6 Rod Height ERFIS and Step 2) below (Inches)											
7)	Difference btw Step 7.2.6 Rod Height RTGB and Step 6) below (Inches)											
9)	Difference btw Step 7.2.6 Rod Height ERFIS and Step 8) below (Inches)											

RCC EXERCISE AND RPI DATA SHEET

<u>SHUTDOWN</u> **BANK ____"B"____ RODS**

			INIT
1)	Are the Restored Height Group Counters ≥200 steps? If yes, go to Step 2 and N/A Steps 6, 7, 8, 9, and 10. If no, go to Step 6 and N/A Steps 2, 3, 4, and 5..	Yes No (Circle One)	____
2)	Convert the Restored Height Group Counter indication to inches by: $\frac{\text{Group Counter Ind.} \times 5 \text{ inches}}{8}$	________ inches	____
3)	Record in the blocks for 3), the difference between each RPI Restored Rod Height RTGB and the value calculated in Step 2).		____
4)	Record in the blocks for 4), the difference between each RPI Restored Rod Height ERFIS and the value calculated in Step 2).		____
5)	Are all the values recorded in the blocks for 3) <u>AND</u> 4), less than or equal to 15 inches? (If no, notify Superintendent Shift Operations.)	Yes No N/A (Circle One)	____
6)	Calculate the average bank position for RTGB indications by adding the individual restored rod height position indications RTGB and dividing by the number of rods in the bank.	________ (inches)	____
7)	Record in the blocks for 7), the difference between each RPI Restored Rod Height RTGB and the value calculated in Step 6).		____
8)	Record ERFIS Shutdown Bank "B" group average position.	________ (inches)	____
9)	Record in the blocks for 9), the difference between each RPI Restored Rod Height ERFIS and the value calculated in Step 8).		____
10)	Are all the values recorded in the blocks for 7) <u>AND</u> 9) less than or equal to 7.5 inches? (If no, notify Superintendent Shift Operations.)	Yes No N/A (Circle One)	____

RCC EXERCISE AND RPI DATA SHEET

CONTROL BANK "A" RODS

STEP NO.	ROD POSITION INDICATION	G5	E9	J11	L7	J5	E7	G11	L9	GROUP COUNTER	1	2
7.3.1	Initial Rod Height RTGB (Inches)									Initial Height (Steps)		
	Initial Rod Height ERFIS (Inches)											
7.3.4	Tested Rod Height RTGB (Inches)									Tested Height (Steps)		
	Tested Rod Height ERFIS (Inches)											
7.3.6	Restored Rod Height RTGB (Inches)									Restored Height (Steps)		
	Restored Rod Height ERFIS (Inches)											
3)	Difference btw Step 7.3.6 Rod Height RTGB and Step 2) below (Inches)											
4)	Difference btw Step 7.3.6 Rod Height ERFIS and Step 2) below (Inches)											
7)	Difference btw Step 7.3.6 Rod Height RTGB and Step 6) below (Inches)											
9)	Difference btw Step 7.3.6 Rod Height ERFIS and Step 8) below (Inches)											

RCC EXERCISE AND RPI DATA SHEET

CONTROL BANK "A" RODS

			INIT
1)	Are the Restored Height Group Counters ≥200 steps? If yes, go to Step 2 and N/A Steps 6, 7, 8, 9 and 10. If no, go to Step 6 and N/A Steps 2, 3, 4, and 5	Yes No (Circle One)	____
2)	Convert the Restored Height Group Counter indication to inches by: $\frac{\text{Group Counter Ind. x 5 inches}}{8}$	________ inches	____
3)	Record in the blocks for 3), the difference between each RPI Restored Rod Height RTGB and the value calculated in Step 2).		____
4)	Record in the blocks for 4), the difference between each RPI Restored Rod Height ERFIS and the value calculated in Step 2).		____
5)	Are all the values recorded in the blocks for 3) AND 4), less than or equal to 15 inches? (If no, notify Superintendent Shift Operations.)	Yes No N/A (Circle One)	____
6)	Calculate the average bank position for RTGB indications by adding the individual restored rod height position indications RTGB and dividing by the number of rods in the bank.	________ (inches)	____
7)	Record in the blocks for 7), the difference between each RPI Restored Rod Height RTGB and the value calculated in Step 6).		____
8)	Record ERFIS Control Bank "A" group average position.	________ (inches)	____
9)	Record in the blocks for 9), the difference between each RPI Restored Rod Height ERFIS and the value calculated in Step 8).		____
10)	Are all the values recorded in the blocks for 7) AND 9) less than or equal to 7.5 inches? (If no, notify Superintendent Shift Operations.)	Yes No N/A (Circle One)	____

ATTACHMENT 8.1
Page 7 of 12

RCC EXERCISE AND RPI DATA SHEET

CONTROL **BANK** **"B"** **RODS**

STEP NO.	ROD POSITION INDICATION	F2	B10	K14	P6	K2	B6	F14	P10	GROUP COUNTER	1	2
7.4.1	Initial Rod Height RTGB (Inches)									Initial Height (Steps)		
	Initial Rod Height ERFIS (Inches)											
7.4.4	Tested Rod Height RTGB (Inches)									Tested Height (Steps)		
	Tested Rod Height ERFIS (Inches)											
7.4.6	Restored Rod Height RTGB (Inches)									Restored Height (Steps)		
	Restored Rod Height ERFIS (Inches)											
3)	Difference btw Step 7.4.6 Rod Height RTGB and Step 2) below (Inches)											
4)	Difference btw Step 7.4.6 Rod Height ERFIS and Step 2) below (Inches)											
7)	Difference btw Step 7.4.6 Rod Height RTGB and Step 6) below (Inches)											
9)	Difference btw Step 7.4.6 Rod Height ERFIS and Step 8) below (Inches)											

RCC EXERCISE AND RPI DATA SHEET

CONTROL BANK "B" RODS

			INIT
1)	Are the Restored Height Group Counters ≥200 steps? If yes, go to Step 2 and N/A Steps 6, 7, 8, 9 and 10. If no, go to Step 6 and N/A Steps 2, 3, 4, and 5	Yes No (Circle One)	____
2)	Convert the Restored Height Group Counter indication to inches by: $\frac{\text{Group Counter Ind. x 5 inches}}{8}$	________ inches	____
3)	Record in the blocks for 3), the difference between each RPI Restored Rod Height RTGB and the value calculated in Step 2).		____
4)	Record in the blocks for 4), the difference between each RPI Restored Rod Height ERFIS and the value calculated in Step 2).		____
5)	Are all the values recorded in the blocks for 3) AND 4), less than or equal to 15 inches? (If no, notify Superintendent Shift Operations.)	Yes No N/A (Circle One)	____
6)	Calculate the average bank position for RTGB indications by adding the individual restored rod height position indications RTGB and dividing by the number of rods in the bank.	________ (inches)	____
7)	Record in the blocks for 7), the difference between each RPI Restored Rod Height RTGB and the value calculated in Step 6).		____
8)	Record ERFIS Control Bank "B" group average position.	________ (inches)	____
9)	Record in the blocks for 9), the difference between each RPI Restored Rod Height ERFIS and the value calculated in Step 8).		____
10)	Are all the values recorded in the blocks for 7) AND 9) less than or equal to 7.5 inches? (If no, notify Superintendent Shift Operations.)	Yes No N/A (Circle One)	____

RCC EXERCISE AND RPI DATA SHEET

CONTROL BANK "C" RODS

STEP NO.	ROD POSITION INDICATION	F4	D10	K12	M6	K4	D6	F12	M10	GROUP COUNTER	1	2
7.5.1	Initial Rod Height RTGB (Inches)									Initial Height (Steps)		
	Initial Rod Height ERFIS (Inches)											
7.5.4	Tested Rod Height RTGB (Inches)									Tested Height (Steps)		
	Tested Rod Height ERFIS (Inches)											
7.5.6	Restored Rod Height RTGB (Inches)									Restored Height (Steps)		
	Restored Rod Height ERFIS (Inches)											
3)	Difference btw Step 7.5.6 Rod Height RTGB and Step 2) below (Inches)											
4)	Difference btw Step 7.5.6 Rod Height ERFIS and Step 2) below (Inches)											
7)	Difference btw Step 7.5.6 Rod Height RTGB and Step 6) below (Inches)											
9)	Difference btw Step 7.5.6 Rod Height ERFIS and Step 8) below (Inches)											

RCC EXERCISE AND RPI DATA SHEET

CONTROL BANK "C" RODS

			INIT
1)	Are the Restored Height Group Counters ≥200 steps? If yes, go to Step 2 and N/A Steps 6, 7, 8, 9 and 10. If no, go to Step 6 and N/A Steps 2, 3, 4, and 5.	Yes No (Circle One)	____
2)	Convert the Restored Height Group Counter indication to inches by: $\frac{\text{Group Counter Ind. x 5 inches}}{8}$	________ inches	____
3)	Record in the blocks for 3), the difference between each RPI Restored Rod Height RTGB and the value calculated in Step 2).		____
4)	Record in the blocks for 4), the difference between each RPI Restored Rod Height ERFIS and the value calculated in Step 2).		____
5)	Are all the values recorded in the blocks for 3) <u>AND</u> 4), less than or equal to 15 inches? (If no, notify Superintendent Shift Operations.)	Yes No N/A (Circle One)	____
6)	Calculate the average bank position for RTGB indications by adding the individual restored rod height position indications RTGB and dividing by the number of rods in the bank.	________ (inches)	____
7)	Record in the blocks for 7), the difference between each RPI Restored Rod Height RTGB and the value calculated in Step 6).		____
8)	Record ERFIS Control Bank "C" group average position.	________ (inches)	____
9)	Record in the blocks for 9), the difference between each RPI Restored Rod Height ERFIS and the value calculated in Step 8).		____
10)	Are all the values recorded in the blocks for 7) <u>AND</u> 9) less than or equal to 7.5 inches? (If no, notify Superintendent Shift Operations.)	Yes No N/A (Circle One)	____

RCC EXERCISE AND RPI DATA SHEET

CONTROL BANK "D" RODS

STEP NO.	ROD POSITION INDICATION	D8	M8	H4	H8	H12	GROUP COUNTER	1	2
*	Initial Rod Height RTGB (Inches)						Initial Height (Steps)		
	Initial Rod Height ERFIS (Inches)								
*	Tested Rod Height RTGB (Inches)						Tested Height (Steps)		
	Tested Rod Height ERFIS (Inches)								
*	Restored Rod Height RTGB (Inches)						Restored Height (Steps)		
	Restored Rod Height ERFIS (Inches)								
3)	Difference btw Restored Rod Height RTGB and Step 2) below (Inches)								
4)	Difference btw Restored Rod Height ERFIS and Step 2) below (Inches)								
7)	Difference btw Restored Rod Height RTGB and Step 6) below (Inches)								
9)	Difference btw Restored Rod Height ERFIS and Step 8) below (Inches)								

* As per Method 1, 2, or 3 (see Sections 7.6, 7.7, and 7.8)

RCC EXERCISE AND RPI DATA SHEET

CONTROL BANK "D" RODS

			INIT
1)	Are the Restored Height Group Counters ≥200 steps? If yes, go to Step 2 and N/A Steps 6, 7, 8, 9 and 10. If no, go to Step 6 and N/A Steps 2, 3, 4, and 5.	Yes No (Circle One)	____
2)	Convert the Restored Height Group Counter indication to inches by: $\frac{\text{Group Counter Ind. x 5 inches}}{8}$	________ inches	____
3)	Record in the blocks for 3), the difference between each RPI Restored Rod Height RTGB and the value calculated in Step 2).		____
4)	Record in the blocks for 4), the difference between each RPI Restored Rod Height ERFIS and the value calculated in Step 2).		____
5)	Are all the values recorded in the blocks for 3) <u>AND</u> 4), less than or equal to 15 inches? (If no, notify Superintendent Shift Operations.)	Yes No N/A (Circle One)	____
6)	Calculate the average bank position for RTGB indications by adding the individual restored rod height position indications RTGB and dividing by the number of rods in the bank.	________ (inches)	____
7)	Record in the blocks for 7), the difference between each RPI Restored Rod Height RTGB and the value calculated in Step 6).		____
8)	Record ERFIS Control Bank "D" group average position.	________ (inches)	____
9)	Record in the blocks for 9), the difference between each RPI Restored Rod Height ERFIS and the value calculated in Step 8).		____
10)	Are all the values recorded in the blocks for 7) <u>AND</u> 9) less than or equal to 7.5 inches? (If no, notify Superintendent Shift Operations.)	Yes No N/A (Circle One)	____

ATTACHMENT 8.2
Page 1 of 1

SURVEILLANCE TEST PROCEDURE
CERTIFICATION AND REVIEW FORM

Scheduled / Unscheduled (Circle one)

(If unscheduled, state reason for test)

____
____
____
____

Test Performed By:

Initials	Name (Print)	Date

Test Complete: Date:__________ Time:__________

Test Satisfactory: Yes / No (Circle one)

Reviewed by: ____________________ __________
Shift Technical Advisor Date

Comments: (Required if results were unsatisfactory)

____
____
____
____
____
____

Approved by: ____________________ __________
Unit 2 - Superintendent Shift Operations Date

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM COM-A.1-1

Perform a Manual Shutdown Margin Calculation (FMP-012)

CANDIDATE: ______________________________

EXAMINER: ______________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task: Perform a Manual Shutdown Margin Calculation (FMP-012)

Alternate Path: NONE

Facility JPM #: CR-049 (Modified)

K/A Rating: 2.1.25 Importance: SRO 3.1 RO 2.8

K/A Statement: Ability to obtain and interpret station reference materials such as graphs, monographs, and tables which contain performance data.

Task Standard: The available Shutdown Margin is calculated to be 3638 +/- 60 pcm.

Preferred Evaluation Location: Simulator X In Plant ______

Preferred Evaluation Method: Perform X Simulate ______

References: FMP-012, Manual Determination of Shutdown Margin Boron Concentration
Station Curve Book
FMP-001, Core Operating Limits Report

Validation Time: 30 minutes Time Critical: NO

Candidate: ______________________

Time Start: ________ Time Finish: ________

Performance Time: ________ minutes

Performance Rating: SAT ________ UNSAT ________

Comments: ______________________

____

Examiner: ______________________ Date: ________
Signature

Tools/Equipment/Procedures Needed:

FMP-012
FMP-001
RHP Station Curve Book
Calculator

READ TO OPERATOR

DIRECTION TO CANDIDATE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

The unit had been operating for approximately 5 days at 100% power following a Refueling. Core burnup is 150 MWD/MtU.

Following a turbine runback, a rod control malfunction resulted in the rods not being able to be withdrawn. Control Bank D-08 rod is misaligned from the other Control Bank 'D' rods by > 4". All rods are considered to be trippable.

Current conditions are:

TIME/DATE	1000 on March 4, 2001
POWER	68%
RCS Tavg	566 °F
BORON	1198 ppm (Last sample taken at 0055 on March 4, 2001)

Current Rod Positions are:

SD 'A', SD 'B', CB 'A', and CB 'B'	GROUP DEMAND 225 steps All IRPI at 141"
Control Bank 'C'	
GROUP DEMAND	208 steps
Rod K-04	130.0"
Rod F-04	130.0"
Rod D-06	130.0"
Rod D-10	130.0"
Rod F-12	130.0"
Rod K-12	130.0"
Rod M-10	130.0"
Rod M-06	130.0"
Control Bank 'D'	
GROUP DEMAND	80 steps
Rod H-04	50.5"
Rod D-08	46.2"
Rod H-12	50.5"
Rod M-08	50.0"
Rod H-08	50.5"

INITIATING CUES:

You have been directed to determine the available Shutdown Margin in accordance with FMP-012, "Manual Determination of Shutdown Margin Boron Concentration."

START TIME: ________

STEP 1:	Locates proper procedure and required information	
STANDARD:	Locates FMP-012, Section 6.1, and Station Curve Book	
NOTES:	***NOTE: Will also require FMP-001, Attachment 7.1, Curve 5.0 later during performance.*** ***AN ANSWER KEY IS PROVIDED FOR THE EXAMINER. REQUIRED DATA TO PERFORM THE CALCULATION WILL NOT BE SPECIFICALLY LISTED IN THE FOLLOWING JPM STEPS, BUT EXPLANATIONS ON WHERE DATA IS OBTAINED AND HOW IT IS DETERMINED WILL BE INCLUDED.***	____ SAT
COMMENTS:		____ UNSAT

STEP 2:	If there are only misaligned control rod(s) which are located in Control Banks D or C, then determine current reactor conditions and complete Lines 1 through 6, Section I on Attachment 7.1, otherwise N/A Sections I, II, and III in Attachment 7.1 and continue with step 6.1.4 and Section IV of Attachment 7.1 (**Step 6.1.1**)	**CRITICAL STEP**
STANDARD:	Determines Section I. of Attachment 7.1 is required to be completed and enters data based on given data AND calculates individual rod position for Bank 'C' and Bank 'D' rods - particular rod of concern is Rod D-08 in Bank 'D', calculated to be at 74 steps	
NOTES:	**CRITICAL TO CALCULATE BANK 'D' ROD POSITIONS CORRECTLY FOR COMPARISON TO RIL.** ***NOTE: Individual rod positions, in steps, determined by multiplying given rod position, in inches, by 1.6.***	____ SAT ____ UNSAT
COMMENTS:		

STEP 3:	Using the COLR or Curve Book, Table 1.9 or Curve 1.9 and the power level recorded in Attachment 7.1, Section I, Step 2, determine the RIL for Control Banks D and C and record in Section II, Attachment 7.1 (**Step 6.1.2**)	**CRITICAL STEP**
STANDARD:	Using Curve 1.9a, for BOL, determines RIL for 68% power to be Control Bank 'D' at 77 ± 2 steps and Control Bank 'C' at 205 ± 2 steps	
NOTES:	**CRITICAL TO DETERMINE RIL CORRECTLY TO ENSURE REQUIREMENT MET TO COMPLETE ATTACHMENT FOR SDM.** ***NOTE: Determined by calculating using slope for curves. Reading curve will yield result greater than 75 steps for Bank 'D' and 205 steps for Bank 'C'.***	____ SAT ____ UNSAT
COMMENTS:		

STEP 4:	Determine if all of the control rods in Control Banks C and D are above the rod insertion limit and circle the appropriate response in Section III, Attachment 7.1. If the response is yes, then N/A Sections IV through XI of Attachment 7.1, and continue with Step 6.1.13. If the response is no then continue with Step 6.1.4 and complete the rest of Attachment 7.1 (**Step 6.1.3**)	**CRITICAL STEP**
STANDARD:	Determines rod D-08 in Bank 'D' is below the RIL, circles NO, and continues on in Section IV of Attachment 7.1	
NOTES:	**CRITICAL TO DETERMINE FURTHER VERIFICATION OF SDM IS WARRANTED.** ***NOTE: RIL for Bank 'D' previously determined to be 77 $\pm$ 2 steps. Rod D-08 previously determined to be at 74 steps, below the lower tolerance for the RIL.***	____ SAT ____ UNSAT
COMMENTS:		

STEP 5:	Determine current reactor conditions and complete Lines 1 through 4, Section IV on Attachment 7.1 (**Step 6.1.4**)	
STANDARD:	Determines current conditions based on given data and enters data in Section IV of Attachment 7.1	
NOTES:	***NOTE: All data given in initial conditions.***	___ SAT
COMMENTS:		___ UNSAT

STEP 6:	Determine the Total Power Defect based on the Latest Available RCS Boron Concentration, Power Level, and exposure recorded in Section IV, Attachment 7.1, using Curve Book, Table 1.3 or Curve 1.3, and record in Section V of Attachment 7.1 (**Step 6.1.5**)	
STANDARD:	Using Curve 1.3a for BOL, determines total Power Defect to be 1110 $\pm$ 50 pcm and enters data in Section V of Attachment 7.1	
NOTES:	***NOTE: Actual value calculated assuming linear relationship from 50% to 100% power. Using curve, value obtained is slightly greater than 1100 pcm and tolerance allows some allowance for interpretation of reading.*** ***Critical step is considered to be actual determination of total reactivity.***	____ SAT
COMMENTS:		____ UNSAT

STEP 7:	Determine the total integral inserted/misaligned rod(s) worth by recording the inches of the lowest inserted rod in Control Banks D and C and lowest misaligned rod within the bank for each misaligned bank in Section VI, Attachment 7.1, then converting the steps of the insertion/misalignment of each bank into worths by using the Table 1 of Attachment 7.4, and record in Section VI, Attachment 7.1, then totaling up the worths and recording in Section VI, Attachment 7.1 (**Step 6.1.6**)	
STANDARD:	Using Table 1 of Attachment 7.4, determines inserted worth of Bank 'D' rods, based on lowest inserted rod (D-08), to be 597 $\pm$ 5 pcm, determines inserted worth of Bank 'C' rods, to be 144 $\pm$ 5 pcm, AND determines Total Worth of inserted rods to be 741 $\pm$ 10 pcm and enters data in Section VI of Attachment 7.1	
NOTES:	***NOTE: Worth of Bank 'D' rods determined by interpolating values between 43 and 51 inches. Worth of Bank 'C' rods determined by selecting value for 130 inches. Assigned tolerance of $\pm$ 5 pcm to both to ensure value within next higher/lower rod position listed. Total worth determined by adding both determined values and tolerances.*** ***Critical step is considered to be actual determination of total reactivity.***	____ SAT
COMMENTS:		____ UNSAT

STEP 8:	Determine the Total Rod Worths based on the current cycle exposure recorded in Attachment 7.1, Section IV, Step 1, using Table 2 of Attachment 7.4, and record in Section VII, Attachment 7.1 (**Step 6.1.7**)	
STANDARD:	Using Table 2 of Attachment 7.4, determinces the Total Rod Worth to be 5489 pcm and enters data in Section VII of Attachment 7.1	
NOTES:	***NOTE: Determined by referencing table and recording number since core age given (150 MWD/MtU) is a value listed in table. No tolerance allowed.*** ***Critical step is considered to be actual determination of total reactivity.***	____ SAT
COMMENTS:		____ UNSAT

STEP 9:	Determine the number of inoperable/untrippable control rods. If there are inoperable/untrippable control rods, then calculate the worth by multiplying the number of untrippable/inoperable rods by the worth of the Most Reactive Rod, and record in Section VIII, Attachment 7.1, otherwise N/A (**Step 7.1.8**)	
STANDARD:	Determines there are NO inoperable/untrippable rods and N/As Section VIII of Attachment 7.1	
NOTES:	***NOTE: Rods will not move, but are still considered to be trippable until it is determined that will not trip.***	____ SAT
COMMENTS:		____ UNSAT

STEP 10:	Calculate the available SDM by subtracting the worths of any Inserted/Misaligned Bank(s), Power Defect, and any Inoperable/Untrippable Rod(s) from the Total Rod Worths, and record in Section IX, Attachment 7.1 (**Step 6.1.9**)	**CRITICAL STEP**
STANDARD:	Calculates the available SDM, by subtracting the inserted rod worths and the power defect from the total rod worth, to be 3638 $\pm$ 60 pcm and enters data in Section IX of Attachment 7.1	
NOTES:	**CRITICAL TO CALCULATE VALUE ACCURATELY TO DETERMINE SDM AVAILABLE.** ***NOTE: Value obtained by subtracting actual determined values and tolerance determined by adding all tolerances.***	____ SAT
COMMENTS:		____ UNSAT

STEP 11:	Determine the required SDM based on the Latest Available RCS boron concentration recorded in attachment 7.1, Section IV, Step 4, using Figure 5.0 of the COLR (FMP-001), and record in Section X, Attachment 7.1 (**Step 6.1.10**)	**CRITICAL STEP**
STANDARD:	Using given boron concentration of 1198 ppm, and Figure 5.0 of FMP-001, determines required SDM to be 1%, or 1000 pcm, and records data in Section X of Attachment 7.1	
NOTES:	**CRITICAL TO ACCURATELY DETERMINE REQUIRED SDM FOR COMPARISON TO ACTUAL SDM.** ***NOTE: Value determined using Figure 5.0. All boron concentrations above 640 ppm require a SDM of 1%.***	____ SAT
COMMENTS:		____ UNSAT

STEP 12:	Determine if adequate SDM exists by comparing the available SDM calculated in Section IX, Attachment 7.1 to the required SDM determined in Section X, Attachment 7.1. If the available SDM is greater than required SDM, then Adequate SDM exists, circle YES, N/A the rest of Section XI, Attachment 7.1 and proceed to Step 6.1.13. If not, then circle NO and perform Step 6.1.12 (**Step 6.1.11**)	**CRITICAL STEP**
STANDARD:	Determines adequate SDM exists by determining available SDM (3638 $\pm$ 60 pcm) to be greater than required SDM (1000 pcm), circles YES, N/As the remainder of Section XI of Attachment 7.1 and proceeds to Step 6.1.13	
NOTES:	**CRITICAL TO DETERMINE AVAILABLE SDM GREATER THAN REQUIRED SDM.** ***NOTE: Determined by comparing values previously determined.***	____ SAT
COMMENTS:		____ UNSAT

STEP 13:	Have the SSO, or CRSS, or Supervisor - Reactor Systems review and approve ATTACHMENT 7.1 (**Step 6.1.13**)	
STANDARD:	Notifies SSO/CRSS of satisfactory results of calculation and provides copy of calculation for review/approval	
NOTES:	***CUE: SSO/CRSS ACKNOWLEDGES RESULTS.***	___ SAT
COMMENTS:		___ UNSAT
	END OF TASK	

STOP TIME: ________

EXAMINER KEY FOR JPM COM-A.1-1

ATTACHMENT 7.1
Page 3 of 3
SHUTDOWN MARGIN MODES 1, 2 DATA FORM

VIII. Number of inoperable/untrippable control rods **0**

If there are inoperable/untrippable rods then calculate the worth by performing the following, otherwise N/A.

N/A	*	1493 pcm	=	**N/A** pcm
# of rods		Most Reactive Rod (BOL, Cycle 20)		Inop./Untrip. Rod Worth

IX. The available SDM is calculated by:

5489	-	**741 ± 10**	-	**1110 ± 50**	-	**0**	=	**3638 ± 60** pcm
Total Rod Worth (Step VII)		Inserted/ Misaligned Worth (Step VI)		Power Defect Worth (Step V)		Inop/Untrip Rod Worth (Step VIII)		Available Shutdown Margin

X. Based on the Latest Available boron concentration and Figure 5.0, Cycle 20 COLR (FMP-001), the required SDM is **1.0** % * 1000 pcm = **1000** pcm

XI. Is the available SDM greater than the required SDM?

CIRCLE ONE

YES Adequate Shutdown Margin Exists

NO Adequate Shutdown Margin does not exist; perform the following:

1) Based on the current exposure, Tave, and latest available Boron Concentration, and using Curve Book, Table 1.5 or Curve 1.5, the Boron Worth is (-) **N/A** pcm/ppm

2) Borate to restore available SDM. Need to borate at least

(**N/A** pcm	-	**N/A** pcm)/	(-) **N/A** pcm/ppm	=	**N/A** ppm
Available SDM (Step IX)		Required SDM (Step X)	Boron Worth (Step XI.1)		Amount to borate

Performed By:________________________ Date:__________

Approved By: ________________________ Date:__________
SSO or CRSS or Supervisor - Reactor Systems

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CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

The unit had been operating for approximately 5 days at 100% power following a Refueling. Core burnup is 150 MWD/MtU.

Following a turbine runback, a rod control malfunction resulted in the rods not being able to be withdrawn. Control Bank D-08 rod is misaligned from the other Control Bank 'D' rods by > 4". All rods are considered to be trippable.

Current conditions are:

TIME/DATE	1000 on March 4, 2001
POWER	68%
RCS Tavg	566 °F
BORON	1198 ppm (Last sample taken at 0055 on March 4, 2001)

Current Rod Positions are:

SD 'A', SD 'B', CB 'A', and CB 'B'	GROUP DEMAND 225 steps All IRPI at 141"
Control Bank 'C'	
GROUP DEMAND	208 steps
Rod K-04	130.0"
Rod F-04	130.0"
Rod D-06	130.0"
Rod D-10	130.0"
Rod F-12	130.0"
Rod K-12	130.0"
Rod M-10	130.0"
Rod M-06	130.0"
Control Bank 'D'	
GROUP DEMAND	80 steps
Rod H-04	50.5"
Rod D-08	46.2"
Rod H-12	50.5"
Rod M-08	50.0"
Rod H-08	50.5"

INITIATING CUES:

You have been directed to determine the available Shutdown Margin in accordance with FMP-012, "Manual Determination of Shutdown Margin Boron Concentration."

EXAMINER KEY FOR JPM COM-A.1-1

ATTACHMENT 7.1
Page 1 of 3

SHUTDOWN MARGIN MODES 1, 2 DATA FORM

I. Current reactor critical conditions:

1. Date/Time conditions recorded 3/04/01 / 1000
2. Reactor Power 68 % Full Power
3. Demand D Bank Position 80 steps
4. Demand C Bank Position 208 steps
5. Record RPI indication for Control Bank D and convert to steps below

Rod	H-04	D-08	H-12	M-08	H-08
Inches	50.5	46.2	50.5	50.0	50.5
Steps (1.6*Inches)	81	74	81	80	81

6. Record RPI indication for Control Bank C and convert to steps below

Rod	K-04	F-04	D-06	D-10	F-12	K-12	M-10	M-06
Inches	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0
Steps (1.6*Inches)	208	208	208	208	208	208	208	208

II. Based on the Power Level and using Curve Book, Table 1.9 or Curve 1.9, the RIL for

Control Bank D is 77 ± 2 steps Control Bank C is 205 ± 2 steps

III. Are the control rods in Control Banks C and D above the RIL,

CIRCLE ONE

YES Adequate SDM exists and no further verification is warranted, and N/A Sections IV through XI, Attachment 7.1.

NO Further verification of SDM is warranted, complete Sections IV through XI, Attachment 7.1.

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EXAMINER KEY FOR JPM COM-A.1-1

ATTACHMENT 7.1
Page 2 of 3
SHUTDOWN MARGIN MODES 1, 2 DATA FORM

IV. Record the following

1. Current Cycle exposure (from Control Room Status Board) **150** MWD/MTU
2. Reactor Power Level **68** %
3. Tave **566** degrees F
4. Latest Available RCS Boron Concentration **1198** ppm

   Sample Time **00: 55**, Date **3/ 4/ 01**

V. Based on the Latest Available RCS Boron Concentration, Power Level, and exposure and using Curve Book, Table 1.3 or Curve 1.3, the Total Power Defect is **1110 ± 50** pcm

> **NOTE:** Data entered into the table below will be based on the lowest indicated RPI in the bank. An untrippable rod should not be counted as a misaligned rod.

VI. Determine the RPI position of the lowest rod in control banks D and C and enter into the table below. If a misaligned rod(s) is in CBB, CBA, SBB, SBA, or if the bank(s) are below RIL, then determine the RPI position of the lowest rod(s) within that bank and enter into the table below. Using Table 1, Attachment 7.4, determine the integral bank worth of the inserted/misaligned rod(s) by filling out the table below:

	CBD	CBC	CBB	CBA	SBB	SBA	Total Worth
Lowest Indicated RPI [Inches]	**46.2**	**130.0**	**141**	**141**	**141**	**141**	
WORTH [pcm]	**597 ± 5**	**144 ± 5**	**0**	**0**	**0**	**0**	**741 ± 10**

VII. Based on the current cycle exposure and using the Table 2, Attachment 7.4, the Total Rod Worth is **5489** pcm

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CAROLINA POWER & LIGHT COMPANY
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 6
PART 5

FUEL MANAGEMENT PROCEDURE

FMP-012

MANUAL DETERMINATION OF SHUTDOWN MARGIN BORON CONCENTRATION

REVISION 14

SUMMARY OF CHANGES

DATE	REVISION #	REVISION COMMENTS
10/10/99	14	This procedure has been modified to remove Cycle 19 specific data and replace with Cycle 20 specific data; specifically, MRR and Attachment 7.4.
11/21/97	13	This procedure has been modified to remove Cycle 18 specific data and replace with Cycle 19 specific data; specifically, MRR and Attachment 7.4. The procedure has also been modified to remove references to CTS.

TABLE OF CONTENTS

1.0 PURPOSE

1.1 To identify the Technical Specification Shutdown Margin requirements and describe how H. B. Robinson complies with those requirements.

1.2 To provide instructions for determining Shutdown Margin in the event of misaligned control rod(s) or inoperable/untrippable control rod(s).

1.3 To provide the necessary information to manually determine a Shutdown Margin boron concentration in order to comply with Technical Specifications for Modes 1, 2, 3, 4, 5, and 6 in the event Powertrax can not be used.

NOTE:	PLP-037 is not applicable to this procedure.

2.0 REFERENCES

2.1 H. B. Robinson - Unit 2 Station Curve Book

2.1.1 Curve 1.1 and Table 1.1, Critical Boron Letdown Curve

2.1.2 Curve 1.3 and Table 1.3, Power Defect vs. Power

2.1.3 Curve 1.5 and Table 1.5, Differential Boron Worth vs. Boron Concentration

2.1.4 Curve 1.9 and Table 1.9, Rod Insertion Limits

2.1.5 Curve 1.11 and Table 1.11, Boron Concentration Required to Maintain A Minimum of 1.77% $\Delta k/k$ Shutdown Margin

2.1.6 Curve 1.14 and Table 1.14, Boron Concentration Required to Maintain 4.0% $\Delta k/k$ Shutdown Margin

2.2 Technical Specifications ITS LCO 3.1.1, LCO 3.1.4, LCO 3.1.5, LCO 3.1.6, LCO 3.4.5, LCO 3.4.6, LCO 3.9.1, ITS SR 3.1.1.1, SR 3.4.5.6, SR 3.9.1.1

2.3 ACR 92-316

2.4 PLP-100, Technical Requirements Manual (TRM)

2.5 FMP-001, Core Operating Limit Report (COLR)

2.6 ESR 98-00395, Cycle 20 Core Design and Safety Analysis

3.0 RESPONSIBILITIES

3.1 Manual calculation of shutdown margin boron concentration shall be performed by either Reactor Systems Engineering or Operations personnel.

3.2 The Superintendent - Shift Operations, OR Control Room Superintendent Shift Operations, OR the Supervisor - Reactor Systems shall review and approve each manual shutdown margin calculation prior to its being considered valid.

4.0 DEFINITIONS/ABBREVIATIONS

4.1 Steady state, as used in this procedure, is the point at which power level has not changed for a minimum of 72 hours.

4.2 MWD/MTU - Megawatt-Days/Metric Ton Uranium, a unit of cycle exposure.

4.3 SDM - Shutdown Margin

4.4 RIL - Rod Insertion Limits

4.5 ITS - Improved Technical Specifications

4.6 COLR - Core Operating Limit Report

4.7 SSO - The Superintendent - Shift Operations

4.8 CRSS - Control Room Superintendent Shift Operations

5.0 GENERAL

5.1 SDM is the instantaneous amount of reactivity by which the reactor is subcritical or would be subcritical from its present condition less the untrippable rod(s), if all control rods fully inserted except for the single control rod of highest reactivity worth which is assumed to remain fully withdrawn. SDM is initially maintained by control rods, the existing Reactor Coolant System (RCS) boron concentration and the presence of fission product poisons (xenon and samarium). Additional boron must be added to the RCS to offset the positive reactivity inserted by the decay of the fission product poisons in order to maintain the SDM.

5.2 Determination of the Boron Concentration Required to Provide Shutdown Margin

5.2.1 Modes 1 and 2

If the reactor is critical (Mode 1 and Mode 2 with Keff $\geq$ 1.0), then adequate SDM can be verified by checking that the control rods are above the RILs specified in the COLR. If the control rods are above the RILs and all are trippable, then adequate SDM exists and no other verifications are necessary. However, if any control rod banks are below the RILs, or if any control rod(s)are misaligned and below the RILs, or if any control rod(s) are untrippable, then a SDM verification must be performed by determining the available SDM and comparing it to the required SDM. The available SDM is calculated by first determining the Total Rod Worth based on cycle exposure. The Total Rod Worth includes allowances for an unknown stuck rod (N-1), Power Shape effects, a 10% rod worth design uncertainty and other uncertainties. Once the Total Rod Worth is determined, the Power Defect and inserted D Bank worth for the current plant conditions as well as the worth of any misaligned control rod bank(s) and the worth of any Inoperable/ Untrippable control rod(s) are subtracted from the Total Rod Worth to determine the available SDM. If the available SDM is less than the required SDM, then a potential exists for not having adequate SDM and the RCS must be borated to restore SDM.

5.2.1 (Continued)

During startup (Mode 2 with Keff < 1.0), ITS SR 3.1.6.1 requires verification that the estimated critical control bank position is above the RILs. Adequate SDM is maintained as long as the RCS boron concentration is greater than or equal to the boron concentration which would result in criticality with the control rods at or above the RILs.

5.2.2 Modes 3 through 5

The boron concentration determined from Station Curve Book Curve 1.11 or Table 1.11 or from the POWERTRAX program for a specific RCS temperature will maintain the reactor 1% Δk/k subcritical (k_{eff} = 0.99) at that temperature with no xenon, equilibrium samarium and all control rods fully <u>inserted</u> except for Shutdown Bank A and the control rod with the highest reactivity worth. Shutdown Bank A is verified during the core design process to have sufficient negative reactivity to make the reactor subcritical by at least an additional 0.77% Δk/k over the entire life of the core. Therefore, the boron concentration determined from Curve 1.11 or Table 1.11 of the Station Curve Book or from the POWERTRAX program will provide <u>at least</u> 1.77% Δk/k SDM.

The boron concentration determined from Station Curve Book, Curve 1.14 or Table 1.14 for a specific RCS temperature will provide a SDM as specified in the COLR at that temperature with no xenon, equilibrium samarium and the single control rod of highest reactivity worth fully withdrawn.

The boron concentration required to maintain a specified SDM decreases as the cycle exposure increases; therefore, the boron concentration required for a lower cycle exposure will typically conservatively bound the boron concentration required to maintain that same SDM at a higher cycle exposure. However, this may not always be true at the beginning of a cycle with large amounts of burnable poison in the core. Always verify the shape of the SDM curves versus exposure.

5.2.2 (Continued)

The boron concentration required to maintain a specified SDM typically decreases as the temperature increases. However, during conditions when the boron concentration in the RCS is very high, it is possible that the opposite is true. This is typical in the refueling mode when high boron concentrations are required. So it should not be assumed that the boron concentration required for a lower temperature will conservatively bound the boron concentration required to maintain that same SDM at a higher RCS temperature. A verification of SDM curves within the range of the temperatures and boron concentrations expected during the modes of operation should be performed in order to determine if the boron concentration based on the lower RCS temperature will bound the SDM requirements.

5.2.3 Mode 6

The boron concentration provided in the COLR is verified during the core design process to maintain at least the SDM as specified in the COLR and ITS Bases at temperatures up to and including 140°F.

5.3 Shutdown Margin Requirements

The amount of SDM required by ITS as specified in the COLR varies with plant conditions and core life. The SDM requirements and how H. B. Robinson meets those requirements are described below:

5.3.1 Power Operation, (Mode 1)

When the reactor is in Power Operation (Keff $\geq$ 0.99 and Power > 5%), the SDM requirements are specified in the COLR. The maximum SDM requirement, typically, occurs at the end of core life (low boron concentration) and is based on the value used in the analysis of the hypothetical steamline break accident. The additional SDM is required to suppress the positive reactivity inserted by an uncontrolled cooldown at the end of core life. ITS 3.1.1 is not applicable in Mode 1. However, there are LCOs which require a verification of SDM during certain control rod configurations in Mode 1. The following is a description of such requirements.

5.3.1 (Continued)

LCO 3.1.4 requires for all the control rods to be operable. If one or more rods becomes inoperable then perform required actions A.1.1, Verify SDM is within limits specified in the COLR, OR A.1.2, Initiate boration to restore SDM to within limit, and these actions need to be performed within 1 hour. If one rod is not within alignment limits then perform required actions B.2.1.1, Verify SDM is within limits specified in the COLR, OR B.2.1.2, Initiate boration to restore SDM to within limit, and these actions need to be performed within 1 hour, AND perform required action B.2.3, Verify SDM is within limits specified in the COLR once per 12 hours. If more than one rod is not within alignment limit then perform required actions D.1.1, Verify SDM is within limits specified in the COLR, OR D.1.2, Initiate boration to restore SDM to within limit, and these actions need to be performed within 1 hour.

LCO 3.1.5 requires each shutdown bank shall be within insertion limits specified in the COLR. If one or both shutdown banks not within limits as specified in the COLR, then perform required actions A.1.1, Verify SDM is within limits specified in the COLR, OR A.1.2, Initiate boration to restore SDM to within limit, and these actions need to be performed within 1 hour.

LCO 3.1.6 requires control banks shall be within the insertion, sequence, and overlap limits specified in the COLR. If control bank insertion limits are not met, then perform the following required actions A.1.1, Verify SDM is within limits specified in the COLR, OR A.1.2, Initiate boration to restore SDM to within limit, and these actions need to be performed within 1 hour. If control bank sequence or overlap limits are not met, then perform required actions B.1.1, Verify SDM is within limits specified in the COLR, OR B.1.2, Initiate boration to restore SDM to within limit, and these actions need to be performed within 1 hour.

5.3.2 Startup, (Mode 2)

When the reactor is in Startup (Keff $\geq$ 0.99 and Power $\leq$ 5%), the SDM requirements are specified in the COLR. The maximum SDM requirement, typically, occurs at the end of core life (low boron concentration) and is based on the value used in the analysis of the hypothetical steamline break accident. The additional SDM is required to suppress the positive reactivity inserted by an uncontrolled cooldown at the end of core life. ITS 3.1.1 is <u>not</u> applicable in Mode 2 with Keff $\geq$ 1.0. However, ITS 3.1.1 in mode 2 with Keff < 1.0 is met by maintaining the required SDM as specified in the COLR during the entire fuel cycle and by performing SR 3.1.1.1, Verify SDM every 24 hours.

In addition to the above requirements there are LCOs which require a verification of SDM during certain control rod configurations. The following is a description of such requirements.

LCO 3.1.4 in Mode 2 requires for all the control rods to be operable. If one or more rods becomes inoperable then perform required actions A.1.1, Verify SDM is within limits specified in the COLR, OR A.1.2, Initiate boration to restore SDM to within limit, and these actions need to be performed within 1 hour. If one rod is not within alignment limits then perform required actions B.2.1.1, Verify SDM is within limits specified in the COLR, OR B.2.1.2, Initiate boration to restore SDM to within limit, and these actions need to be performed within 1 hour, AND perform required action B.2.3, Verify SDM is within limits specified in the COLR once per 12 hours. If more than one rod is not within alignment limit then perform required actions D.1.1, Verify SDM is within limits specified in the COLR, OR D.1.2, Initiate boration to restore SDM to within limit, and these actions need to be performed within 1 hour.

LCO 3.1.5 in Mode 2 with any control bank not fully inserted requires each shutdown bank shall be within insertion limits specified in the COLR. If one or both shutdown banks are not within limits as specified in the COLR, then perform required actions A.1.1, Verify SDM is within limits specified in the COLR, OR A.1.2, Initiate boration to restore SDM to within limit, and these actions need to be performed within 1 hour.

5.3.2 (Continued)

LCO 3.1.6 in Mode 2 with Keff $\geq$ 1.0 requires control banks shall be within the insertion, sequence, and overlap limits specified in the COLR. If control bank insertion limits are not met, then perform the following required actions A.1.1, Verify SDM is within limits specified in the COLR, OR A.1.2, Initiate boration to restore SDM to within limit, and these actions need to be performed within 1 hour. If control bank sequence or overlap limits are not met, then perform required actions B.1.1, Verify SDM is within limits specified in the COLR, OR B.1.2, Initiate boration to restore SDM to within limit, and these actions need to be performed within 1 hour.

5.3.3 Hot Standby, (Mode 3)

When the reactor is in Hot Standby (Keff < 0.99 and $T_{avg} \geq 350°F$), the SDM requirements are specified in the COLR. The SDM requirements are based on the Boron Concentration in the RCS and the number of reactor coolant loops in operation. The maximum SDM requirement for $\geq$ 2 reactor coolant loops in operation typically occurs at the end of core life (low boron concentration) and is based on the value used in the analysis of the hypothetical steamline break accident. The additional SDM is required to suppress the positive reactivity inserted by an uncontrolled cooldown at the end of core life. ITS 3.1.1 is met by providing required boron concentrations in Curve Book Curve 1.11 which maintain a SDM of $\geq$ 1.77% $\Delta k/k$ during the entire fuel cycle, and by verifying that the actual RCS boron concentration is greater than or equal to the required boron concentration (ITS SR 3.1.1.1).

With less than two reactor coolant loops in operation AND the rod control system capable of rod withdrawal AND the reactor trip breakers closed AND the lift disconnect switches for all control rods not fully withdrawn closed then additional SDM is required. ITS LCO 3.4.5.d requires that a SDM as specified in the COLR be maintained. ITS LCO 3.4.5.d is met by providing required boron concentrations in Curve Book Curve 1.14 which provide the required SDM and by verifying that the actual RCS boron concentration is greater than or equal to the required boron concentration. (ITS SR 3.4.5.6)

5.3.4 Hot Shutdown, (Mode 4)

When the reactor is in Hot Shutdown (Keff < 0.99 and 200°F < T_{avg} < 350°F), the SDM requirements are specified in the COLR. The SDM requirements are based on the Boron Concentration in the RCS and the number of reactor coolant loops in operation. The maximum SDM requirement for ≥ 2 reactor coolant loops in operation typically occurs at the end of core life (low boron concentration) and is based on the value used in the analysis of the hypothetical steamline break accident. The additional SDM is required to suppress the positive reactivity inserted by an uncontrolled cooldown at the end of core life. ITS 3.1.1 is met by providing required boron concentrations in Curve Book Curve 1.11 which maintain a SDM of ≥ 1.77% Δk/k during the entire fuel cycle, and by verifying that the actual RCS boron concentration is greater than or equal to the required boron concentration (ITS SR 3.1.1.1).

With less than two reactor coolant loops in operation AND the rod control system capable of rod withdrawal AND the reactor trip breakers closed AND the lift disconnect switches for all control rods not fully withdrawn closed then additional SDM is required. ITS LCO 3.4.5.d requires that a SDM as specified in the COLR be maintained. ITS LCO 3.4.5.d is met by providing required boron concentrations in Curve Book Curve 1.14 which provide the required SDM and by verifying that the actual RCS boron concentration is greater than or equal to the required boron concentration. (ITS SR 3.4.5.6)

With less than one loop or train consisting of RCS loops or residual heat removal (RHR) trains in operation AND the rod control system capable of rod withdrawal, ITS LCO 3.4.6, Action C.1 requires that all operations involving a reduction of RCS boron concentration to be suspended immediately.

5.3.5 Cold Shutdown, (Mode 5)

When the reactor is in Cold Shutdown (Keff < 0.99 and $T_{avg} \leq 200°F$), ITS 3.1.1 requires a SDM as specified in the COLR. ITS 3.1.1 is met by administratively requiring a SDM of ≥ 1.77% Δk/k for all RCS temperatures and by performing SR 3.1.1.1, Verify SDM every 24 hours.

5.3.6 Refueling, (Mode 6)

When the reactor is in the refueling mode (one or more reactor vessel head closure bolts less than fully tensioned and RCS temperatures ≤ 140°F {TRM 1.1}), ITS 3.9.1 requires a Boron Concentration as specified in the COLR. The core design process verifies that an RCS boron concentration as specified in the COLR will provide adequate SDM at RCS temperatures ≤ 140°F. Therefore, ITS 3.9.1 is met by verifying that the RCS boron concentration is at least as specified in the COLR and is conducted by performing SR 3.9.1.1, Verify SDM every 72 hours.

6.0 PROCEDURE

NOTE: If it is desired to determine the SDM boron concentration for a particular plant mode only, then perform either sections 6.1, 6.2, or 6.3 and complete either ATTACHMENT 7.1, 7.2, or 7.3 respectively and N/A all others. Section 6.1 is performed only as a response to the LCO required action.

6.1 Mode 1 and 2

6.1.1 If there are only misaligned control rod(s) which are located in Control Banks D or C, then determine current reactor conditions and complete Lines 1 through 6, Section I on Attachment 7.1, otherwise N/A Sections I, II, and III in Attachment 7.1 and continue with step 6.1.4 and Section IV of Attachment 7.1.

6.1.2 Using the COLR or Curve Book, Table 1.9 or Curve 1.9 and the power level recorded in Attachment 7.1, Section I, Step 2, determine the RIL for Control Banks D and C and record in Section II, Attachment 7.1.

6.1.3 Determine if all of the control rods in Control Banks C and D are above the rod insertion limit and circle the appropriate response in Section III, Attachment 7.1. If the response is yes, then N/A Sections IV through XI of Attachment 7.1, and continue with Step 6.1.13. If the response is no then continue with Step 6.1.4 and complete the rest of Attachment 7.1.

6.1.4 Determine current reactor conditions and complete Lines 1 through 4, Section IV on Attachment 7.1 .

6.1.5 Determine the Total Power Defect based on the Latest Available RCS Boron Concentration, Power Level, and exposure recorded in Section IV, Attachment 7.1, using Curve Book, Table 1.3 or Curve 1.3, and record in Section V of Attachment 7.1.

6.1.6 Determine the total integral inserted/misaligned rod(s) worth by recording the inches of the lowest inserted rod in Control Banks D and C and lowest misaligned rod within the bank for each misaligned bank in Section VI, Attachment 7.1, then converting the steps of the insertion/misalignment of each bank into worths by using the Table 1 of Attachment 7.4, and record in Section VI, Attachment 7.1, then totaling up the worths and recording in Section VI, Attachment 7.1.

6.1.7 Determine the Total Rod Worths based on the current cycle exposure recorded in Attachment 7.1, Section IV, Step 1, using Table 2 of Attachment 7.4, and record in Section VII, Attachment 7.1.

6.1.8 Determine the number of inoperable/untrippable control rods. If there are inoperable/untrippable control rods, then calculate the worth by multiplying the number of untrippable/inoperable rods by the worth of the Most Reactive Rod, and record in Section VIII, Attachment 7.1, otherwise N/A.

6.1.9 Calculate the available SDM by subtracting the worths of any Inserted/Misaligned Bank(s), Power Defect, and any Inoperable/ Untrippable Rod(s) from the Total Rod Worths, and record in Section IX, Attachment 7.1.

6.1.10 Determine the required SDM based on the Latest Available RCS boron concentration recorded in attachment 7.1, Section IV, Step 4, using Figure 5.0 of the COLR (FMP-001), and record in Section X, Attachment 7.1.

6.1.11 Determine if adequate SDM exists by comparing the available SDM calculated in Section IX, Attachment 7.1 to the required SDM determined in Section X, Attachment 7.1. If the available SDM is greater than required SDM, then Adequate SDM exists, circle YES, N/A the rest of Section XI, Attachment 7.1 and proceed to Step 6.1.13. If not, then circle NO and perform Step 6.1.12.

6.1.12 Determine the amount of boron that is needed in order to re-establish the available SDM above the required SDM by subtracting the required SDM determined in Section X, Attachment 7.1 from the available SDM calculated in Section IX, Attachment 7.1 and dividing by the Differential Boron Worth based on the Latest Available RCS Boron Concentration, exposure, and Tave, and using the Curve Book, Table 1.5 or Curve 1.5. Record in Section XI, Attachment 7.1.

6.1.13 Have the SSO, or CRSS, or Supervisor - Reactor Systems review and approve ATTACHMENT 7.1.

6.1.14 Send the completed ATTACHMENT 7.1 to the Vault for permanent storage.

6.2 Modes 3, 4, 5

6.2.1 Using the most recent steady state Critical Data Stamp, COMPLETE Lines 1 through 5 on Attachment 7.2.

6.2.2 Record the current Cycle Exposure on Line 6 of Section I on ATTACHMENT 7.2.

> **NOTE:** If it is not desired to determine the SDM boron concentration for a particular plant condition, then that section of ATTACHMENT 7.2 may be marked N/A.

6.2.3 Using Curve 1.11 and/or Table 1.11 of the Station Curve Book, locate the boron concentration corresponding to the current Cycle Exposure and 547°F, and record in Section II, ATTACHMENT 7.2.

6.2.4 Determine the lowest anticipated RCS temperature during the shutdown, and record in Section III, ATTACHMENT 7.2.

6.2.5 Using Curve 1.11 and/or Table 1.11 of the Station Curve Book, locate the boron concentration corresponding to the current cycle exposure and the lowest RCS temperature expected during the Shutdown, and record in Section III, ATTACHMENT 7.2.

6.2.6 Determine the lowest RCS temperature expected to be achieved during the shutdown with < 2 RCPs in operation, and the rod control system capable of withdrawal (the reactor trip breakers closed and lift coil disconnects closed), and record in Section IV, ATTACHMENT 7.2.

6.2.7 Using Curve 1.14 and/or Table 1.14 of the Station Curve Book, locate the boron concentration corresponding to the current cycle exposure and the lowest RCS temperature anticipated while the reactor trip breakers are closed, and record in Section IV, ATTACHMENT 7.2.

6.2.8 Have the SSO, or CRSS, or Supervisor - Reactor Systems review and approve ATTACHMENT 7.2.

6.2.9 Send the completed ATTACHMENT 7.2 to the Vault for permanent storage.

6.3 Mode 6

6.3.1 Refer to the current COLR for the appropriate refueling boron concentration, and record in Section I, Attachment 7.3.

6.3.2 Have the SSO, or CRSS, or Supervisor - Reactor Systems review and approve ATTACHMENT 7.3.

6.3.3 Send the completed ATTACHMENT 7.3 to the Vault for permanent storage.

7.0 **ATTACHMENTS**

7.1 Shutdown Margin Modes 1,2 Data Form

7.2 Shutdown Margin Boron Concentration Modes 3,4,5 Data Form

7.3 Shutdown Margin Boron Concentration Mode 6 Data Form

7.4 Control Rod Worths

SHUTDOWN MARGIN MODES 1, 2 DATA FORM

I. Current reactor critical conditions:

1. Date/Time conditions recorded ________/________
2. Reactor Power ______ % Full Power
3. Demand D Bank Position ____________ steps
4. Demand C Bank Position ____________ steps
5. Record RPI indication for Control Bank D and convert to steps below

Rod	H-04	D-08	H-12	M-08	H-08
Inches					
Steps (1.6*Inches)					

6. Record RPI indication for Control Bank C and convert to steps below

Rod	K-04	F-04	D-06	D-10	F-12	K-12	M-10	M-06
Inches								
Steps (1.6*Inches)								

II. Based on the Power Level and using Curve Book, Table 1.9 or Curve 1.9, the RIL for

Control Bank D is ________ steps Control Bank C is ________ steps

III. Are the control rods in Control Banks C and D above the RIL,

CIRCLE ONE

YES Adequate SDM exists and no further verification is warranted, and N/A Sections IV through XI, Attachment 7.1.

NO Further verification of SDM is warranted, complete Sections IV through XI, Attachment 7.1.

SHUTDOWN MARGIN MODES 1, 2 DATA FORM

IV. Record the following

1. Current Cycle exposure (from Control Room Status Board) ________MWD/MTU
2. Reactor Power Level _______ %
3. Tave _______ degrees F
4. Latest Available RCS Boron Concentration ______ ppm

   Sample Time___:____, Date___/__/__

V. Based on the Latest Available RCS Boron Concentration, Power Level, and exposure and using Curve Book, Table 1.3 or Curve 1.3, the Total Power Defect is _________ pcm

> **NOTE:** Data entered into the table below will be based on the lowest indicated RPI in the bank. An untrippable rod should not be counted as a misaligned rod.

VI. Determine the RPI position of the lowest rod in control banks D and C and enter into the table below. If a misaligned rod(s) is in CBB, CBA, SBB, SBA, or if the bank(s) are below RIL, then determine the RPI position of the lowest rod(s) within that bank and enter into the table below. Using Table 1, Attachment 7.4, determine the integral bank worth of the inserted/misaligned rod(s) by filling out the table below:

	CBD	CBC	CBB	CBA	SBB	SBA	Total Worth
Lowest Indicated RPI [Inches]							
WORTH [pcm]							

VII. Based on the current cycle exposure and using the Table 2, Attachment 7.4, the Total Rod Worth is __________ pcm

SHUTDOWN MARGIN MODES 1, 2 DATA FORM

VIII. Number of inoperable/untrippable control rods ________

If there are inoperable/untrippable rods then calculate the worth by performing the following, otherwise N/A.

________	*	1493 pcm	=	__________ pcm
# of rods		Most Reactive Rod (BOL, Cycle 20)		Inop./Untrip. Rod Worth

IX. The available SDM is calculated by:

__________	-	___________	-	___________	-	____________	=	______ pcm
Total Rod Worth		Inserted/ Misaligned Worth		Power Defect Worth		Inop/Untrip Rod Worth		Available Shutdown Margin
(Step VII)		(Step VI)		(Step V)		(Step VIII)		

X. Based on the Latest Available boron concentration and Figure 5.0, Cycle 20 COLR (FMP-001), the required SDM is _______% * 1000 pcm = _______pcm

XI. Is the available SDM greater than the required SDM?

CIRCLE ONE

YES Adequate Shutdown Margin Exists

NO Adequate Shutdown Margin does not exist; perform the following:

1) Based on the current exposure, Tave, and latest available Boron Concentration, and using Curve Book, Table 1.5 or Curve 1.5, the Boron Worth is (-)_________ pcm/ppm

2) Borate to restore available SDM. Need to borate at least

(__________pcm	-	__________pcm)/	(-) ________ pcm/ppm	=	_________ ppm
Available SDM (Step IX)		Required SDM (Step X)	Boron Worth (Step XI.1)		Amount to borate

Performed By:____ Date:___________

Approved By: ____ Date:___________
SSO or CRSS or Supervisor - Reactor Systems

SHUTDOWN MARGIN BORON CONCENTRATION MODES 3, 4, 5 DATA FORM

I. Most recent steady state critical conditions:

1. Date/Time conditions recorded ________/________
2. Reactor Power ______ % Full Power
3. D Bank Position ____________ steps
4. RCS Boron Concentration ____________ ppm
5. T_{ave} ____________ °F
6. Cycle Exposure (from Control Room Status Board)____________ MWD/MTU

II. Boron Concentration Required to Maintain a Minimum of 1.77% Δk/k Shutdown Margin at 547°F.

Minimum Reactor Coolant System Boron Concentration = ________ ppm

III. Boron Concentration Required to Maintain a Minimum of 1.77% Δk/k Shutdown Margin at reduced Reactor Coolant System temperatures:

Lowest Anticipated RCS Temperature = ________ °F

Minimum Reactor Coolant System Boron Concentration = ________ ppm

IV. Boron Concentration Required to Maintain a Minimum of 4% Δk/k Shutdown Margin:

Lowest Anticipated RCS Temperature = ________ °F

Minimum Reactor Coolant System Boron Concentration = ________ ppm

Performed By:____ Date:__________

Approved By: ____ Date:__________
SSO or CRSS or Supervisor - Reactor Systems

SHUTDOWN MARGIN BORON CONCENTRATION MODE 6 DATA FORM

I. Current Refueling Outage_______

Minimum Boron Concentration _______ ppm

Performed By:____ Date:___________

Approved By:____ Date:___________
SSO or CRSS or Supervisor - Reactor Systems

ATTACHMENT 7.4
Page 1 of 2
CONTROL ROD WORTHS

NOTE: This data is only valid for HB Robinson Unit 2, Cycle 20 due to the use of Cycle specific parameters.

TABLE 1
Inserted/Misaligned Bank Worths

Steps	Inches	Control Bank D (pcm)	Control Bank C (pcm)	Control Bank B (pcm)	Control Bank A (pcm)	Shutdown Bank B (pcm)	Shutdown Bank A (pcm)
225	141	0	0	0	0	0	0
213	133	40	52	33	51	52	48
201	126	95	266	66	200	201	223
189	118	206	521	149	389	395	434
177	111	304	745	224	555	564	619
165	103	384	924	282	686	699	764
153	96	443	1079	325	794	810	886
141	88	479	1205	356	874	893	980
129	81	507	1311	375	935	957	1052
117	73	525	1400	387	977	1000	1101
105	66	536	1472	394	1002	1027	1134
93	58	552	1524	398	1018	1043	1153
81	51	580	1559	400	1068	1099	1165
69	43	608	1579	404	1142	1170	1171
57	36	636	1588	421	1207	1246	1196
45	28	662	1593	436	1277	1319	1263
33	21	687	1596	450	1345	1401	1327
21	13	710	1654	462	1425	1483	1381
9	6	730	1692	471	1469	1531	1415
0	0	739	1699	477	1483	1545	1422

CONTROL ROD WORTHS

NOTE: This data is only valid for HB Robinson Unit 2, Cycle 20 due to the use of Cycle specific parameters.

TABLE 2 Total Rod Worth	
Exposure (MWD/MTU)	Total Rod Worth (pcm)
0	5490
150	5489
500	5488
1000	5486
2000	5482
3000	5477
4000	5473
5000	5469
6000	5465
7000	5461
8000	5457
9000	5452
10,000	5448
11,000	5444
12,000	5440
13,000	5436
14,000	5432
15,000	5427
16,000	5423
17,000	5419

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM SRO-A.1-2

Determine Work Time Limits for Heat Stress Conditions (AP-020)

CANDIDATE: ______________________________

EXAMINER: ______________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task: Determine Work Time Limits for Heat Stress Conditions (AP-020)

Alternate Path: NONE

Facility JPM #: CR-058

K/A Rating: 2.1.26 Importance: SRO 2.6 RO NA

K/A Statement: Knowledge of non-nuclear safety procedures (e.g. rotating equipment, electrical, high temperature, high pressure, caustic, chlorine, oxygen and hydrogen).

Task Standard: Determines the maximum time that an auxiliary operator can work inside containment is 40 minutes and that a 45 minute recovery period is required.

Preferred Evaluation Location: Simulator X In Plant ______

Preferred Evaluation Method: Perform X Simulate ______

References: AP-020, Heat Stress Program

Validation Time: 10 minutes Time Critical: NO

Candidate: ______________________________

Time Start: __________ Time Finish: ______

Performance Time: ______ minutes

Performance Rating: SAT ______ UNSAT ______

Comments: ______________________________________

____

Examiner: ______________________________ Date: ______
Signature

Tools/Equipment/Procedures Needed:

AP-020

READ TO OPERATOR

DIRECTION TO CANDIDATE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

The unit is in Hot Standby.

An auxiliary operator will be entering containment to perform PLP-006, "Containment Vessel Inspection/Closeout". It is expected that it will take 30 minutes to complete the required task.

He will be wearing single cloth coveralls over scrub suit and is in good health with no known medical problems or illness.

The remote measured temperature using a dry bulb thermometer is 96 °F, and the relative humidity inside containment is approximately 60%.

INITIATING CUES:

Complete Attachment 6.3 of AP-020, "Heat Stress Program," to determine the maximum time that the auxiliary operator can work inside containment AND the amount of time that must be alloted for recovery following performance of the task.

START TIME: ________

STEP 1: Locates proper procedure and required information STANDARD: Locates AP-020, Attachment 6.3 NOTES: ***NOTES:*** ***1) The steps in AP-020 have been condensed in this JPM for easier understanding. It may be helpful for the evaluator to have a copy of the procedure to follow along. JPM is written to follow format of Attachment 6.3.*** ***2) A completed copy of Attachment 6.3, "Heat Stress Evaluation Form," is attached for comparison as an Answer Key.*** COMMENTS:	____ SAT ____ UNSAT
STEP 2: Enter data on Attachment 6.3 for Job Date, Job Location, Task, Supervisor, Estimated Job Duration, Number of Workers, Plant Status, and Clothing Type STANDARD: Enters the following data: Job Date - TODAY'S DATE Job Location - CV Task - PERFORM CV INSPECTION Supervisor - CANDIDATE'S NAME Estimated Job Duration - 0.5 HOURS Number of Workers - 1 Plant Status - HOT STANDBY Clothing Type - SINGLE CLOTH COVERALLS OVER SCRUB SUIT NOTES: ***NOTE: Data provided in initial conditions.*** COMMENTS:	____ SAT ____ UNSAT

<table>
<tr><td>STEP 2:</td><td>Determine Metabolic Heat Load</td><td>CRITICAL
STEP</td></tr>
<tr><td>STANDARD:</td><td>Using the guidance of Attachment 6.1, determines metabolic heat load to be MODERATE</td><td></td></tr>
<tr><td>NOTES:</td><td>CRITICAL TO DETERMINE ALLOWED WORK TIME

NOTE: Per Attachment 6.1, moderate work are those average demands that are typical of a system walk-down, valve alignments, valve and motor repairs, and light materials handling.</td><td>____ SAT</td></tr>
<tr><td>COMMENTS:</td><td></td><td>____ UNSAT</td></tr>
<tr><td>STEP 4:</td><td>Determine the Wet Bulb Globe Temperature (WBGT) for the work area</td><td></td></tr>
<tr><td>STANDARD:</td><td>Using Attachment 6.4, Estimating WBGT, determines the WBGT is 91 °F and completes data entry on Attachment 6.3 as follows:
Circles ESTIMATED
WBGT = 91
DB = 96
WB = N/A
GT = N/A</td><td></td></tr>
<tr><td>NOTES:</td><td>CRITICAL TO ACCURATELY ESTIMATE WBGT TO DETERMINE ALLOWED WORK TIME.

NOTE: Estimated by using table in Attachment 6.4 and determining 60% humidity requires subtracting 5 °F from the dry bulb temperature.</td><td>____ SAT</td></tr>
<tr><td>COMMENTS:</td><td></td><td>____ UNSAT</td></tr>
</table>

STEP 5:	Determine ACTION TIME	**CRITICAL STEP**
STANDARD:	Using Attachment 6.2, determines ACTION TIME to be 40 minutes	
NOTES:	**CRITICAL TO ACCURATELY DETERMINE ALLOWED WORK TIME.** ***NOTE: Determined by referencing Attachment 6.2, locating section for Cloth Coveralls Over Scrub Suit, locating WBGT of 91 °F, and reading value listed under MODERATE metabolic heat load.***	____ SAT
COMMENTS:		____ UNSAT
STEP 6:	Determine RECOVERY PERIOD	**CRITICAL STEP**
STANDARD:	Calculates recovery period to be 45 minutes	
NOTES:	**CRITICAL TO ACCURATELY DETERMINE RECOVERY TIME TO PERMIT OPERATOR TO COOL DOWN FOLLOWING TASK.** ***NOTE: Determined by dividing actual task performance time by action time and then multiplying by 60 minutes.***	____ SAT
COMMENTS:		____ UNSAT
	END OF TASK	

STOP TIME: ________

EXAMINER KEY FOR JPM SRO-A.1-2

ATTACHMENT 6.3
Page 1 of 1

HEAT STRESS EVALUATION FORM

JOB DATE: TODAY'S DATE

JOB LOCATION: CV

TASK(S): PERFORM CV INSPECTION (or similar)

SUPERVISOR: CANDIDATE

EST. PERSON-HOURS: 0.5

NUMBER OF WORKERS: 1

PLANT STATUS (for job planning use): HOT STANDBY

CLOTHING TYPE: SINGLE COVERALL OVER SCRUB SUIT

METABOLIC HEAT LOAD (CIRCLE ONE):

LIGHT **MODERATE** **HEAVY**

TEMPERATURE (CIRCLE ONE):

MEASUREMENT **ESTIMATE**

WBGT = 91 F

DB = 96 F **WB** = N/A F **GT** = N/A F

ACTION TIME = 40 minutes (from Attachment 6.2)

RECOVERY PERIOD = 45 minutes = (Time in minutes in Hot Environment) x (60) / (Action Time in minutes)

HAVE WORKERS RECEIVED A PRE-JOB BRIEFING INCLUDING HEAT STRESS CONCERNS? (CIRCLE ONE)

YES **NO**

ADDITIONAL INFORMATION:

Signature (Job Supervisor): ____________ Date: ________

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CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

The unit is in Hot Standby.

An auxiliary operator will be entering containment to perform PLP-006, "Containment Vessel Inspection/Closeout". It is expected that it will take 30 minutes to complete the required task.

He will be wearing single cloth coveralls over scrub suit and is in good health with no known medical problems or illness.

The remote measured temperature using a dry bulb thermometer is 96°F, and the relative humidity inside containment is approximately 60%.

INITIATING CUES:

Complete Attachment 6.3 of AP-020, "Heat Stress Program," to determine the maximum time that the auxiliary operator can work inside containment AND the amount of time that must be alloted for recovery following performance of the task.

CP&L

CAROLINA POWER & LIGHT COMPANY
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 1
PART 1

ADMINISTRATIVE PROCEDURE

AP-020

HEAT STRESS PROGRAM

REVISION 10

Determine procedure usage level **PRIOR** to each use.

SUMMARY OF CHANGES

DATE	REVISION #	REVISION COMMENTS
08/28/00	10	Added Attachment 6.6 (AR 21379).

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1.0 PURPOSE

1.1 The purpose of this procedure is to provide guidance to management and all employees for preventing heat-induced illnesses. This procedure is intended for areas inside and outside of the RCA, where a moderate/high temperature environment exists, e.g., C.V., pipe alley, RHR pit and secondary side of the plant during the warmer months.

2.0 REFERENCES

2.1 EPRI NP-4453-L, "Heat Stress Management Program for Nuclear Power Plants" Revision 1, Aug. 1991.

2.2 Clothing Update of EPRI NP-4453-L, 1991 Report, TR-109445, Final Report, July 1998.

2.3 CP&L Corporate Guidance Document SAF-CPL-032 Heat Stress.

3.0 RESPONSIBILITIES

3.1 Section Managers - Robinson Plant shall be responsible for:

3.1.1 Ensuring that personnel who perform work in moderate/high heat stress work environment(s) follow this procedure.

3.1.2 Ensuring that the supervisors reporting to them utilize this procedure and follow it when planning work in moderate/high heat stress work environments.

3.2 Supervisors shall be responsible for:

3.2.1 Following this procedure when planning a job that is to be performed in a moderate/high heat stress work environment and ensuring that heat stress mitigation has been considered during job planning. The work crew supervisor or designee shall determine the Wet Bulb Globe Temperature and metabolic heat load using the guidance available in Attachments 6.1, 6.2 and 6.6.

3.2.2 Ensuring that either a "Heat Stress Evaluation Form" ATTACHMENT 6.3, is completed or that proper means of determining stay times and control measures have taken place and have been included as part of pre-job planning when Heat Stress has been determined to be an issue.

3.2.3 Ensuring that a pre-job briefing is conducted prior to workers entering the high temperature environment to perform work. The Precautions and Limitations found in section 5.1 of this procedure should be covered in the briefing.

3.2.4 Ensuring that proper control methods are used to protect against heat stress.

3.2.5 Ensuring that all heat-stress caused incidents which require medical attention are recorded on FRM-CPL-009 Supervisor's Report of Accidental Injury. These forms can be obtained on the CP&L Intranet.

3.3 Individuals shall be responsible for:

3.3.1 Obeying instructions given by RC Personnel on the handling of body cooling devices and use them as needed to prevent heat stress.

3.3.2 Being attentive to symptoms of heat stress while working in moderate/high heat stress work environments, stopping work, leaving it in a safe condition, and exiting the hot environment, if they feel ill due to heat stress.

3.3.3 Reporting to their supervisor any occurrence of heat stress or heat related illness.

3.4 E&RC Unit shall be responsible for:

3.4.1 Maintaining and issuing personal cooling equipment. Ice vests will be laundered periodically by laundry vendor.

3.5 Site Industrial Hygiene and Safety Representative shall be responsible for:

3.5.1 Providing technical assistance on heat stress issues, including the development of plant heat stress training programs and maintenance of this procedure.

3.5.2 Ensuring that instruction on heat stress mitigation is arranged and conducted for employees prior to initial work in high temperature environments.

3.5.3 Assisting supervisors in the implementation of this procedure, when requested.

4.0 DEFINITIONS

4.1 Acclimation - The gradual process of improved heat tolerance after continuous exposure to heat. Acclimation consists of reduced heart rate, increased sweat production, production of less salty sweat, and lower body temperature.

4.2 Action Time - An estimate of the length of time workers may be exposed in hot environments without personal cooling devices and not suffer heat stress disorders (used for planning purposes). The length of action times is not absolute because of worker variability in response to heat.

4.3 Cloth Coveralls (CC) - A standard configuration of anticontamination coveralls with a hood and hand and foot coverings. The fabric is either a cotton or cotton/polyester blend with weights of about 8 to 9 oz.

4.4 Cloth Coveralls over Scrub Suit (CS) - The configuration described as CC plus a set of 2 oz cloth underalls (a.k.a. surgical scrub suit).

4.5 Double Cloth Coveralls (DC) - The configuration described as CC plus a second set of cloth coveralls only.

4.6 Dry Bulb Temperature (DB) - The temperature as measured by a standard thermometer, without respect to humidity or radiant heat.

4.7 Encapsulating Suit or Turn-out Gear (ES) - Total encapsulating suits (eg, Level A); re-usable, whole body chemical protective suits; firefighter turn-out gear.

4.8 Flame-Retardant Shirt and Pants (FR) - Long-sleeve shirt and pants made from a treated cotton fabric.

4.9 Globe Temperature (GT) - Temperature resulting from radiant heat sources, measured with a globe thermometer.

4.10 Globe Thermometer - A thermometer with a black globe at its end, used for measuring radiant heat.

4.11 Heat Stress - The physiological stress which occurs when the body temperature rises above normal. This occurs when the body produces or gains more heat than it is capable of losing. It is caused by any combination of air temperature, thermal radiation, humidity, air flow, restrictive clothing, and physical work load which may result in elevated core body temperature and subsequent illness.

4.12 High Heat Stress Job/Work - Any job or work in which the calculated action time, without regard to personal cooling equipment, is less than 30 minutes.

4.13 MB Polyethylene Coveralls (PE) - Limited use coveralls with hood (particle barrier only) made from a meltblown polyethylene (Tyvek 1422A).

4.14 Metabolic Heat Load - Heat generated by the body, which increases with physical work. Examples may be found on Attachment 6.1.

4.15 Moderate Heat Stress Job/Work - Any job/work in which the calculated action time, without regard to personal cooling equipment, is greater than 30 minutes but less than 240 minutes.

4.16 Personal Cooling Device - Equipment such as an ice vest, used to minimize heat gain and/or increase heat loss.

4.17 Polyester Coveralls (P2) - Light-weight polyester (98% nylon)(3 oz) coveralls worn with a hood of the same material (ProTech 2000).

4.18 Polyester Coveralls with Scrubs (PS) - Light-weight polyester coveralls and hood (P2) worn over a typical surgical scrub suit (cotton or cotton/polyester blend).

4.19 Protective Clothing - Items worn to prevent radioactive contamination.

4.20 Recovery Period - Time allowed to be spent outside of a hot area allocated to workers who have performed work in hot environments. Water or gatorade should be available for consumption in the recovery area.

4.21 Relative Humidity - The amount of moisture in the air compared to the amount of moisture the air can hold for a given temperature.

4.22 Self Determination - Allowing for worker discretion to exit Heat Stress Work Areas.

4.23 SMS Polypropylene Coveralls (PP) - Limited-use coveralls with hood (particle barrier only) made from a spunbonded, meltblown polypropylene.

4.24 Supplied Air Hood - Air-supplied hood respirator which will deliver respirable air over the head and upper body.

4.25 Vapor-Barrier Coveralls (VB) - Coveralls and hood made of light weight fabrics designed for limited use. Typical fabrics might be a polyethylene coated spunbonded polyethylene or a polyvinylchloride.

4.26 Water-Barrier, Vapor Permeable Coveralls (WB-1) - Limited-use coverall with hood made from tri-laminate fabric with a tetrafluoroethylene microporous film.

4.27 Water-Barrier, Vapor Permeable Coveralls (WB-2) - Coverall with hood made from tri-laminate fabric with a microporous film.

4.28 Wet-Bulb Temperature (WB) - The temperature as determined by a wet bulb thermometer. This temperature is influenced by the evaporation rate of water, which is dependent upon the relative humidity in air.

4.29 Wet-Bulb Globe Temperature (WBGT) - An index of heat-stress based on globe, dry and wet bulb temperatures.

4.30 Wet-Bulb Globe Thermometer - A thermometer with sensors to measure wet bulb, dry bulb, and globe temperatures.

4.31 Work Clothes (WC) - A standard ensemble that includes a 4 oz cotton shirt with long sleeves and 8 oz cotton pants.

4.32 ALARA (As Low As Reasonably Achievable) - Making every reasonable effort to maintain exposure to radiation as far below the dose limits as is practical, taking into account the state of technology, and the economics of improvements in relation to the benefits.

5.0 PROCEDURE

5.1 Precautions and Limitations

CAUTION

These precautions should be covered in employee training, as well as in the pre-job briefings, prior to performing moderate or high heat stress work.

5.1.1 If an individual begins to feel symptoms of heat illness, the person should put their work in a safe condition, exit the area, notify their supervisor, rest in a cool area, and drink fluids. The Control Room (ext. 5555) should be called if symptoms persist in order to dispatch appropriate site first aid providers.

5.1.2 All jobs in high temperature environments should address heat stress controls in the planning stages. Planned action times and the use of body cooling devices may be considered.

5.1.3 Individuals who work in high temperature environments for the first time are more susceptible to heat illness than those accustomed to hot environments. After working in hot environments for several days, their bodies tend to acclimatize to heat exposure and they may tolerate longer heat exposures at higher work rates.

5.1.4 Work shall be planned so that an adequate number of workers are prepared to work in a high temperature environment. Workers should never work alone in high heat stress areas.

5.1.5 Individuals vary greatly in their tolerance to heat exposure. Factors which may affect heat tolerances may include:

- age
- weight
- sex
- physical fitness
- general health
- colds, viruses, and infections
- some medications
- consumption of alcoholic beverages

5.1.6 In situations where individuals know that their work schedule for the following day involves entering a heat stress area, they should drink plenty of liquids in the 24 hours prior to reporting to work.

5.1.7 Whenever feasible, engineering controls should be used to eliminate/reduce the heat exposure (i.e., isolation of the heat source, introduction of cooled air, circulation of present air, reduced humidity, etc.). The impact of these engineering controls should be reviewed with the Environmental and Radiation Control (E&RC) unit for jobs in radiologically controlled areas.

5.1.8 Individuals who work in high temperature environments may become dehydrated due to sweating. Lost body water and electrolytes should be replaced at rest breaks to prevent heat-related illness. Liquids designed to replace these electrolytes (gatorade) may be obtained from the bulk warehouse prior to or after entry, and should be consumed in frequent, small amounts. (Salt tablets are not recommended.)

5.1.9 Individuals who work in high temperature environments must periodically rest in a cooler area to shed body heat. Duration of breaks, extent of clothing removal, and rest area should be determined by the job supervisor, using the guidance in Step 5.4.1. Certain employees may require longer rest periods than others.

5.1.10 Workers should be encouraged to drink one pint of water/fluid per hour of scheduled work prior to entering high heat stress areas.

5.1.11 Workers should also be encouraged to drink water/fluids after high temperature work to maintain fluid balance.

5.1.12 Where feasible, high heat stress work should be scheduled to minimize thermal stress in the work area. This includes scheduling work at times where the WBGT and/or the metabolic heat load are lower and/or protective clothing requirements are less restrictive.

5.1.13 For pre-job briefings in heat stress related work areas, utilize Attachment 6.6 during the briefing.

5.2 Heat Stress Evaluation

5.2.1 The heat stress evaluation process involves assessing the variables that effect heat stress, including WBGT measurements, metabolic work load, clothing type and recovery periods. These factors are converted to recommended action times without regard to personal cooling devices for job planning purposes. A "Heat Stress Evaluation Form", Attachment 6.3, may be used for heat stress job planning.

NOTE: Care must be used when conducting WBGT readings so as to not create an ALARA concern.

5.2.2 The work crew supervisor/designee should measure the WBGT of the work area when he/she feels that heat stress conditions may exist. WBGT is calculated using the following WBGT formulas:

Indoor WBGT =

(0.7 x wet bulb) + (0.3 x globe)

Outdoor WBGT =

(0.7 x wet bulb) + (0.2 x globe) + (0.1 x dry bulb)

Initial WBGT readings should be made with a Wet Bulb Globe Thermometer, available from the calibration lab. Instructions for the use of the Wet Bulb Globe Thermometer may be found on Attachment 6.5, Using the Wet Bulb Globe Thermometer. Measurements should be representative of the work area thermal load. Succeeding evaluations may be based solely on dry bulb temperature and relative humidity by using Attachment 6.5, "Estimating WBGT". Temperature/Relative Humidity meters are posted at various locations around site to assist with conducting these estimates. Charts on these meters have been developed in accordance with Attachment 6.5, and may be consulted to assist in the estimation of WBGT.

NOTE: The Temperature/Relative Humidity meters have been placed in the shade, where possible. These meters may display inaccurate readings if in direct sunlight (higher than actual temperature and lower than actual relative humidity). The crew supervisor/designee may contact the Site Industrial Hygiene and Safety Representative for assistance in conducting Heat Stress Evaluations.

5.2.3 The work crew supervisor/designee should determine the metabolic heat load using the guide available in Attachment 6.1.

5.2.4 The work crew supervisor/designee should determine the type of work clothing required or being used for the job. The categories include; work clothes (WC), cloth coveralls (CC), cloth coveralls over scrub suit (CS), double cloth coveralls (DC), SMS polypropylene coveralls (PP), MB polyethylene coveralls (PE), polyester coveralls (P2), polyester coveralls with scrubs (PS), water-barrier vapor-permeable coveralls (WB-1), water barrier vapor-permeable coveralls (WB-2), vapor-barrier coveralls (VB), encapsulating suit or turn-out gear (ES), flame retardant shirt and pants (FR).

5.3 Use of Recommended Action Times

5.3.1 Knowing the WBGT measurements, metabolic heat load, and protective clothing used, the work crew supervisor or designee should determine the planned action time from Attachment 6.2 and identify the desired methods to mitigate heat stress if longer work times are necessary.

5.3.2 Action times are used for job planning. Action times are <u>not</u> absolute because of the great variability in worker response to heat-stress. Some workers could experience heat stress symptoms prior to reaching the maximum action time.

5.3.3 By using the planned action time limits and assessing the physical condition of the workers, the work crew supervisor or designee can determine how long his workers can be expected to work before rest breaks should be given. Workers have the right to and should immediately exit the hot environment prior to the time limit if they begin to experience heat stress symptoms.

5.3.4 If there are changes in the WBGT, the metabolic work load category, or the required clothing type during the course of the job, then a re-evaluation of the job action time is necessary.

5.4 Determination of Recovery Period Times

5.4.1 When work cannot be completed in the estimated action time, the supervisor must calculate an appropriate recovery period for workers to dissipate excess heat and replace water. Recovery should take place in a cool location (less than 80 degrees F.) where drinking water or gatorade is available. The length of recovery period depends on the length of exposure and the action time of the job. Recovery periods of up to one hour may be necessary for jobs which approach or exceed the planned action times. The following formula should be used as a guide for determining the minimum length of recovery period:

$$REC = \frac{AET \times 60}{MST}$$

REC-------Recovery Time

AET-------Actual Exposure Time to the Hot Environment

MST------Appropriate Stay Time or Action Time from Attachment 6.2

NOTE: All times are in minutes.

5.5 Use of Ice Vests

5.5.1 By using Attachment 6.2, "Action Times for Planning Use", the work crew leader's supervisor can determine if ice vests would be beneficial for the job.

5.5.2 Individual workers should have the option of wearing an ice vest for any job when they feel there is a need. If an ice vest is worn, then the recommended action time is 60 minutes or until the ice melts.

5.5.3 Ice vests are available in dressout areas in the Radiation Control Area.

5.5.4 The ice vest should be worn so that the vest fits snugly. A t-shirt should be worn under the vest.

CAUTION

As much as practical, the ice vest should not be donned until just prior to entering the hot environment. The ice vest will provide body cooling only while the ice is melting. Once the ice has melted, body temperature will increase quickly. Workers should monitor their condition and exit the work area as soon as the ice vest has lost its cooling effectiveness.

5.6 Use of Supplied Air Hoods

5.6.1 Supplied air hoods are used mainly as respirators and their uses are authorized only by the Radiation Control Unit.

5.6.2 When authorized for use, supplied air hoods will supply respirable air and cooling air to the body. Normal action times per Attachment 6.2 are applicable.

5.7 First Aid For Heat Illness

5.7.1 If any individual begins to feel symptoms of heat illness, then the person should immediately exit the area, notify the supervisor, rest in a cool area, and drink fluids. The Control Room (ext. 5555) should be called if symptoms persist.

5.7.2 Examples of symptoms that should necessitate calling the Control Room are as follows:

- Pulse rate does not decrease in 30-45 minutes
- Unconsciousness
- Cannot drink fluids without vomiting
- Heat stroke
- Any other symptom deemed to be of concern.

5.7.3 The individual in the Control Room who receives the call shall take appropriate actions to ensure further first aid and/or medical attention is provided.

5.7.4 The following first aid actions should be taken at the first sign of heat stress symptoms.

1. Heat Illness - occurs due to an increased body temperature and/or a loss of body fluids and salts.

   First Aid - Rest in cool area, drink water or other liquids to replace body fluids, and eat food high in salt content.

2. Heat Cramps - are muscle spasms due to a loss of salt through sweating. Leg, stomach, and back muscles are most often affected and are often a sign of approaching heat exhaustion. Cramps can also result from drinking large amounts of water without electrolytes (salt, sugar).

   First Aid: Rest in cool area, drink water or other liquids, and eat food high in salt content.

3. Heat Exhaustion - Condition caused by an insufficient flow of blood to the brain (blood is shunted to the skin to lose heat). Symptoms can include cool, pale clammy skin, weakness, dizziness, headache, nausea, and fainting.

   First Aid: Rest in cool area, lie down, elevate feet, apply cool wet cloths, fan with air, and drink liquids.

4. Heat Stroke - a serious medical emergency caused by a failure of the body's cooling mechanisms. Symptoms include hot, dry skin (sweating stops), extremely high body temperatures, strong, rapid pulse, and unconsciousness.

   First Aid: Immediate, rapid cooling of the body is necessary. Use safety showers, move air over the body with a fan or by fanning, or cover the body with a wet sheet. **Seek immediate medical attention.**

6.0 ATTACHMENTS

6.1 Metabolic Heat Load Guidelines

6.2 Action Times for Planning Use

6.3 Heat Stress Evaluation Form

6.4 Estimating WBGT

6.5 Using the Wet Bulb Globe Thermometer

6.6 Heat Stress Pre-Job Briefing

METABOLIC HEAT LOAD GUIDELINES

LIGHT WORK

Light work are those average demands that are typical of job supervision, inspections, instrument repair and calibration, surveying. Light work can be performed indefinitely by everyone.

MODERATE WORK

Moderate work are those average demands that are typical of a system walk-down, valve alignments, valve and motor repairs, and light materials handling. Under cool conditions, moderate work can be easily performed by most people if there is a 10-minute break every hour. Most physically demanding work falls into this category.

HEAVY WORK

Heavy work are those average demands that are typical of gross decontamination, heavy materials handling, and extensive ladder and stair climbing. Even in comfortable conditions, heavy work can be sustained by most people for no more than 60 minutes. It is not often that heavy work is the appropriate classification because rest breaks will reduce the overall demand to the moderate category.

RECOMMENDED HEAT STRESS CONTROL ACTION TIMES TABLE FOR WORK CLOTHES (WC) -

A standard ensemble that includes a 4 oz cotton shirt with long sleeves and 8 oz cotton pants.

(ACTION TIMES IN MINUTES)

WBGT	METABOLIC HEAT LOAD		
degrees F	Light	Moderate	Heavy
81	NL	NL	NL
82	NL	NL	240
83	NL	NL	150
84	NL	240	120
85	NL	210	100
86	NL	165	90
87	NL	135	80
88	NL	110	70
89	240	95	65
90	230	85	55
91	215	80	50
92	200	70	45
93	180	65	40
94	165	55	40
95	150	50	35
96	130	50	35
97	115	45	30
98	110	40	25
99	100	40	25
100	90	35	20
101	85	35	20
102	75	35	20
103	65	30	20
104	60	30	15
105	55	25	PCR
106	50	25	PCR
107	50	25	PCR
108	45	25	PCR
109	40	20	PCR
110	35	20	PCR
111	30	20	PCR
112	30	20	PCR
113	25	20	PCR
114	25	15	PCR
115	25	15	PCR
116	25	PCR	PCR
117	20	PCR	PCR
118	20	PCR	PCR
119	20	PCR	PCR
120	20	PCR	PCR
121	PCR	PCR	PCR

NOTES: NL = No Limit, PCR = Personal Cooling Required

RECOMMENDED HEAT STRESS CONTROL ACTION TIMES TABLE FOR CLOTH COVERALLS (CC) -

A standard configuration of anticontamination coveralls with a hood and hand and foot coverings. The fabric is either a cotton or cotton/polyester blend with weights of about 8 to 9oz.

(ACTION TIMES IN MINUTES)

WBGT	METABOLIC HEAT LOAD		
degrees F	Light	Moderate	Heavy
75	NL	NL	NL
76	NL	NL	240
77	NL	NL	150
78	NL	240	120
79	NL	210	100
80	NL	165	90
81	NL	135	80
82	NL	110	70
83	240	95	65
84	230	85	55
85	215	80	50
86	200	70	45
87	180	65	40
88	165	55	40
89	150	50	35
90	130	50	35
91	115	45	30
92	110	40	25
93	100	40	25
94	90	35	20
95	85	35	20
96	75	35	20
97	65	30	20
98	60	30	15
99	55	25	PCR
100	50	25	PCR
101	50	25	PCR
102	45	25	PCR
103	40	20	PCR
104	35	20	PCR
105	30	20	PCR
106	30	20	PCR
107	25	20	PCR
108	25	15	PCR
109	25	15	PCR
110	25	PCR	PCR
111	20	PCR	PCR
112	20	PCR	PCR
113	20	PCR	PCR
114	20	PCR	PCR
115	PCR	PCR	PCR

NOTES: NL = No Limit, PCR = Personal Cooling Required

ATTACHMENT 6.2
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RECOMMENDED HEAT STRESS CONTROL ACTION TIMES
TABLE FOR CLOTH COVERALLS OVER SCRUB SUIT (CS) -
The configuration described as CC plus a set of 2 oz cloth underalls (a.k.a. surgical scrub suit).
(ACTION TIMES IN MINUTES)

WBGT	METABOLIC HEAT LOAD		
degrees F	Light	Moderate	Heavy
73	NL	NL	NL
74	NL	NL	240
75	NL	NL	150
76	NL	240	120
77	NL	210	100
78	NL	165	90
79	NL	135	80
80	NL	110	70
81	240	95	65
82	230	85	55
83	215	80	50
84	200	70	45
85	180	65	40
86	165	55	40
87	150	50	35
88	130	50	35
89	115	45	30
90	110	40	25
91	100	40	25
92	90	35	20
93	85	35	20
94	75	35	20
95	65	30	20
96	60	30	15
97	55	25	PCR
98	50	25	PCR
99	50	25	PCR
100	45	25	PCR
101	40	20	PCR
102	35	20	PCR
103	30	20	PCR
104	30	20	PCR
105	25	20	PCR
106	25	15	PCR
107	25	15	PCR
108	25	PCR	PCR
109	20	PCR	PCR
110	20	PCR	PCR
111	20	PCR	PCR
112	20	PCR	PCR
113	PCR	PCR	PCR

NOTES: NL = No Limit, PCR = Personal Cooling Required

RECOMMENDED HEAT STRESS CONTROL ACTION TIMES
TABLE FOR DOUBLE CLOTH COVERALLS (DC) -
The configuration described as CC plus a second set of the cloth coveralls only.
(ACTION TIMES IN MINUTES)

WBGT	METABOLIC HEAT LOAD		
degrees F	Light	Moderate	Heavy
72	NL	NL	NL
73	NL	NL	240
74	NL	NL	150
75	NL	240	120
76	NL	210	100
77	NL	165	90
78	NL	135	80
79	NL	110	70
80	240	95	65
81	230	85	55
82	215	80	50
83	200	70	45
84	180	65	40
85	165	55	40
86	150	50	35
87	130	50	35
88	115	45	30
89	110	40	25
90	100	40	25
91	90	35	20
92	85	35	20
93	75	35	20
94	65	30	20
95	60	30	15
96	55	25	PCR
97	50	25	PCR
98	50	25	PCR
99	45	25	PCR
100	40	20	PCR
101	35	20	PCR
102	30	20	PCR
103	30	20	PCR
104	25	20	PCR
105	25	15	PCR
106	25	15	PCR
107	25	PCR	PCR
108	20	PCR	PCR
109	20	PCR	PCR
110	20	PCR	PCR
111	20	PCR	PCR
112	PCR	PCR	PCR

NOTES: NL = No Limit, PCR = Personal Cooling Required

RECOMMENDED HEAT STRESS CONTROL ACTION TIMES TABLE FOR SMS POLYPROPYLENE COVERALLS (PP) - Limited-use coveralls with hood (particle barrier only) made from a spunbonded, meltblown polypropylene. (ACTION TIMES IN MINUTES)

WBGT	METABOLIC HEAT LOAD		
degrees F	Light	Moderate	Heavy
83	NL	NL	NL
84	NL	NL	240
85	NL	NL	150
86	NL	240	120
87	NL	210	100
88	NL	165	90
89	NL	135	80
90	NL	110	70
91	240	95	65
92	230	85	55
93	215	80	50
94	200	70	45
95	180	65	40
96	165	55	40
97	150	50	35
98	130	50	35
99	115	45	30
100	110	40	25
101	100	40	25
102	90	35	20
103	85	35	20
104	75	35	20
105	65	30	20
106	60	30	15
107	55	25	PCR
108	50	25	PCR
109	50	25	PCR
110	45	25	PCR
111	40	20	PCR
112	35	20	PCR
113	30	20	PCR
114	30	20	PCR
115	25	20	PCR
116	25	15	PCR
117	25	15	PCR
118	25	PCR	PCR
119	20	PCR	PCR
120	20	PCR	PCR
121	20	PCR	PCR
122	20	PCR	PCR
123	PCR	PCR	PCR

NOTES: NL = No Limit, PCR = Personal Cooling Required

ATTACHMENT 6.2

RECOMMENDED HEAT STRESS CONTROL ACTION TIMES TABLE FOR MB POLYETHYLENE COVERALLS (PE) - Limited use coveralls with hood (particle barrier only) made from a meltblown polyethylene (Tyvek 1422A). (ACTION TIMES IN MINUTES)

WBGT	METABOLIC HEAT LOAD		
degrees F	Light	Moderate	Heavy
78	NL	NL	NL
79	NL	NL	240
80	NL	NL	150
81	NL	240	120
82	NL	210	100
83	NL	165	90
84	NL	135	80
85	NL	110	70
86	240	95	65
87	230	85	55
88	215	80	50
89	200	70	45
90	180	65	40
91	165	55	40
92	150	50	35
93	130	50	35
94	115	45	30
95	110	40	25
96	100	40	25
97	90	35	20
98	85	35	20
99	75	35	20
100	65	30	20
101	60	30	15
102	55	25	PCR
103	50	25	PCR
104	50	25	PCR
105	45	25	PCR
106	40	20	PCR
107	35	20	PCR
108	30	20	PCR
109	30	20	PCR
110	25	20	PCR
111	25	15	PCR
112	25	15	PCR
113	25	PCR	PCR
114	20	PCR	PCR
115	20	PCR	PCR
116	20	PCR	PCR
117	20	PCR	PCR
118	PCR	PCR	PCR

NOTES: NL = No Limit, PCR = Personal Cooling Required

RECOMMENDED HEAT STRESS CONTROL ACTION TIMES
TABLE FOR POLYESTER COVERALLS (P2) -
Light-weight polyester (98% Nylon)(3 oz) coveralls worn with a hood of the same material (ProTech 2000).
(ACTION TIMES IN MINUTES)

WBGT	METABOLIC HEAT LOAD		
degrees F	Light	Moderate	Heavy
81	NL	NL	NL
82	NL	NL	240
83	NL	NL	150
84	NL	240	120
85	NL	210	100
86	NL	165	90
87	NL	135	80
88	NL	110	70
89	240	95	65
90	230	85	55
91	215	80	50
92	200	70	45
93	180	65	40
94	165	55	40
95	150	50	35
96	130	50	35
97	115	45	30
98	110	40	25
99	100	40	25
100	90	35	20
101	85	35	20
102	75	35	20
103	65	30	20
104	60	30	15
105	55	25	PCR
106	50	25	PCR
107	50	25	PCR
108	45	25	PCR
109	40	20	PCR
110	35	20	PCR
111	30	20	PCR
112	30	20	PCR
113	25	20	PCR
114	25	15	PCR
115	25	15	PCR
116	25	PCR	PCR
117	20	PCR	PCR
118	20	PCR	PCR
119	20	PCR	PCR
120	20	PCR	PCR
121	PCR	PCR	PCR

NOTES: NL = No Limit, PCR = Personal Cooling Required

RECOMMENDED HEAT STRESS CONTROL ACTION TIMES
TABLE FOR POLYESTER COVERALLS WITH SCRUBS (PS) -
Light-weight polyester coveralls and hood (P2) worn over a typical surgical scrub suit (cotton or cotton/polyester blend).
(ACTION TIMES IN MINUTES)

WBGT	METABOLIC HEAT LOAD		
degrees F	Light	Moderate	Heavy
76	NL	NL	NL
77	NL	NL	240
78	NL	NL	150
79	NL	240	120
80	NL	210	100
81	NL	165	90
82	NL	135	80
83	NL	110	70
84	240	95	65
85	230	85	55
86	215	80	50
87	200	70	45
88	180	65	40
89	165	55	40
90	150	50	35
91	130	50	35
92	115	45	30
93	110	40	25
94	100	40	25
95	90	35	20
96	85	35	20
97	75	35	20
98	65	30	20
99	60	30	15
100	55	25	PCR
101	50	25	PCR
102	50	25	PCR
103	45	25	PCR
104	40	20	PCR
105	35	20	PCR
106	30	20	PCR
107	30	20	PCR
108	25	20	PCR
109	25	15	PCR
110	25	15	PCR
111	25	PCR	PCR
112	20	PCR	PCR
113	20	PCR	PCR
114	20	PCR	PCR
115	20	PCR	PCR
116	PCR	PCR	PCR

NOTES: NL = No Limit, PCR = Personal Cooling Required

ATTACHMENT 6.2

RECOMMENDED HEAT STRESS CONTROL ACTION TIMES TABLE FOR WATER-BARRIER, VAPOR-PERMEABLE COVERALLS (WB-1) - Limited-use coverall with hood made from tri-laminate fabric with a tetrafluoroethylene microporous film. (ACTION TIMES IN MINUTES)

WBGT	METABOLIC HEAT LOAD		
degrees F	**Light**	**Moderate**	**Heavy**
70	NL	NL	NL
71	NL	NL	240
72	NL	NL	150
73	NL	240	120
74	NL	210	100
75	NL	165	90
76	NL	135	80
77	NL	110	70
78	240	95	65
79	230	85	55
80	215	80	50
81	200	70	45
82	180	65	40
83	165	55	40
84	150	50	35
85	130	50	35
86	115	45	30
87	110	40	25
88	100	40	25
89	90	35	20
90	85	35	20
91	75	35	20
92	65	30	20
93	60	30	15
94	55	25	PCR
95	50	25	PCR
96	50	25	PCR
97	45	25	PCR
98	40	20	PCR
99	35	20	PCR
100	30	20	PCR
101	30	20	PCR
102	25	20	PCR
103	25	15	PCR
104	25	15	PCR
105	25	PCR	PCR
106	20	PCR	PCR
107	20	PCR	PCR
108	20	PCR	PCR
109	20	PCR	PCR
110	PCR	PCR	PCR

NOTES: NL = No Limit, PCR = Personal Cooling Required

RECOMMENDED HEAT STRESS CONTROL ACTION TIMES
TABLE FOR WATER-BARRIER VAPOR-PERMEABLE COVERALLS (WB-2) -
Coverall with hood made from tri-laminate fabric with a microporous film.
(ACTION TIMES IN MINUTES)

WBGT	METABOLIC HEAT LOAD		
degrees F	Light	Moderate	Heavy
76	NL	NL	NL
77	NL	NL	240
78	NL	NL	150
79	NL	240	120
80	NL	210	100
81	NL	165	90
82	NL	135	80
83	NL	110	70
84	240	95	65
85	230	85	55
86	215	80	50
87	200	70	45
88	180	65	40
89	165	55	40
90	150	50	35
91	130	50	35
92	115	45	30
93	110	40	25
94	100	40	25
95	90	35	20
96	85	35	20
97	75	35	20
98	65	30	20
99	60	30	15
100	55	25	PCR
101	50	25	PCR
102	50	25	PCR
103	45	25	PCR
104	40	20	PCR
105	35	20	PCR
106	30	20	PCR
107	30	20	PCR
108	25	20	PCR
109	25	15	PCR
110	25	15	PCR
111	25	PCR	PCR
112	20	PCR	PCR
113	20	PCR	PCR
114	20	PCR	PCR
115	20	PCR	PCR
116	PCR	PCR	PCR

NOTES: NL = No Limit, PCR = Personal Cooling Required

RECOMMENDED HEAT STRESS CONTROL ACTION TIMES TABLE FOR VAPOR-BARRIER COVERALLS (VB) -
Coveralls and hood made of light weight fabrics designed for limited use.
Typical fabrics might be polyethylene coated spunbonded polyethylene or a polyvinylchloride.
(ACTION TIMES IN MINUTES)

WBGT	METABOLIC HEAT LOAD		
degrees F	Light	Moderate	Heavy
66	NL	NL	NL
67	NL	NL	240
68	NL	NL	150
69	NL	240	120
70	NL	210	100
71	NL	165	90
72	NL	135	80
73	NL	110	70
74	240	95	65
75	230	85	55
76	215	80	50
77	200	70	45
78	180	65	40
79	165	55	40
80	150	50	35
81	130	50	35
82	115	45	30
83	110	40	25
84	100	40	25
85	90	35	20
86	85	35	20
87	75	35	20
88	65	30	20
89	60	30	15
90	55	25	PCR
91	50	25	PCR
92	50	25	PCR
93	45	25	PCR
94	40	20	PCR
95	35	20	PCR
96	30	20	PCR
97	30	20	PCR
98	25	20	PCR
99	25	15	PCR
100	25	15	PCR
101	25	PCR	PCR
102	20	PCR	PCR
103	20	PCR	PCR
104	20	PCR	PCR
105	20	PCR	PCR
106	PCR	PCR	PCR

NOTES: NL = No Limit, PCR = Personal Cooling Required

ATTACHMENT 6.2
Page 12 of 13
RECOMMENDED HEAT STRESS CONTROL ACTION TIMES
TABLE FOR ENCAPSULATING SUIT OR TURN-OUT GEAR (ES) -
Total encapsulating suits (e.g., Level A); reusable whole body chemical protective suits; firefighter turn-out gear.
(ACTION TIMES IN MINUTES)

WBGT	METABOLIC HEAT LOAD		
degrees F	Light	Moderate	Heavy
62	NL	NL	NL
63	NL	NL	240
64	NL	NL	150
65	NL	240	120
66	NL	210	100
67	NL	165	90
68	NL	135	80
69	NL	110	70
70	240	95	65
71	230	85	55
72	215	80	50
73	200	70	45
74	180	65	40
75	165	55	40
76	150	50	35
77	130	50	35
78	115	45	30
79	110	40	25
80	100	40	25
81	90	35	20
82	85	35	20
83	75	35	20
84	65	30	20
85	60	30	15
86	55	25	PCR
87	50	25	PCR
88	50	25	PCR
89	45	25	PCR
90	40	20	PCR
91	35	20	PCR
92	30	20	PCR
93	30	20	PCR
94	25	20	PCR
95	25	15	PCR
96	25	15	PCR
97	25	PCR	PCR
98	20	PCR	PCR
99	20	PCR	PCR
100	20	PCR	PCR
101	20	PCR	PCR
102	PCR	PCR	PCR

NOTES: NL = No Limit, PCR = Personal Cooling Required

RECOMMENDED HEAT STRESS CONTROL ACTION TIMES TABLE FOR FLAME RETARDANT SHIRT AND PANTS (FR) - Long-sleeve shirt and pants made from a treated cotton fabric. (ACTION TIMES IN MINUTES)

WBGT	METABOLIC HEAT LOAD		
degrees F	Light	Moderate	Heavy
79	NL	NL	NL
80	NL	NL	240
81	NL	NL	150
82	NL	240	120
83	NL	210	100
84	NL	165	90
85	NL	135	80
86	NL	110	70
87	240	95	65
88	230	85	55
89	215	80	50
90	200	70	45
91	180	65	40
92	165	55	40
93	150	50	35
94	130	50	35
95	115	45	30
96	110	40	25
97	100	40	25
98	90	35	20
99	85	35	20
100	75	35	20
101	65	30	20
102	60	30	15
103	55	25	PCR
104	50	25	PCR
105	50	25	PCR
106	45	25	PCR
107	40	20	PCR
108	35	20	PCR
109	30	20	PCR
110	30	20	PCR
111	25	20	PCR
112	25	15	PCR
113	25	15	PCR
114	25	PCR	PCR
115	20	PCR	PCR
116	20	PCR	PCR
117	20	PCR	PCR
118	20	PCR	PCR
119	PCR	PCR	PCR

NOTES: NL = No Limit, PCR = Personal Cooling Required

HEAT STRESS EVALUATION FORM

JOB DATE: ____________________

JOB LOCATION: ____________________

TASK(S):

____

____

____

SUPERVISOR: ____________________

EST. PERSON-HOURS: ____________________

NUMBER OF WORKERS: ____________________

PLANT STATUS (for job planning use): ____________________

CLOTHING TYPE: ____________________

METABOLIC HEAT LOAD (CIRCLE ONE):

LIGHT **MODERATE** **HEAVY**

TEMPERATURE (CIRCLE ONE):

MEASUREMENT **ESTIMATE**

WBGT = ________F

DB = ________F **WB** = ________F **GT** = ________F

ACTION TIME = ________ minutes (from Attachment 6.2)

RECOVERY PERIOD = _______ minutes = (Time in minutes in Hot Environment) x (60) / (Action Time in minutes)

HAVE WORKERS RECEIVED A PRE-JOB BRIEFING INCLUDING HEAT STRESS CONCERNS? (CIRCLE ONE)

YES **NO**

ADDITIONAL INFORMATION:

____

____

Signature (Job Supervisor): ______________________ Date: __________

ATTACHMENT 6.4
Page 1 of 1
ESTIMATING WBGT

Measuring WBGT may require entering the work area prior to the start of the job. However, this action could also create an ALARA concern.

There are two methods which can be used to estimate the WBGT without entering the work area.

- The first method is to estimate the WBGT based on previously recorded measurements, such as those obtained from the Heat Stress Evaluation Form (Attachment 6.4). The plant condition and work location must be essentially identical to use this method.
- The second method is based on a remote reading of the dry bulb temperature (DB) and an estimation of the relative humidity as follows:

RELATIVE HUMIDITY	ESTIMATED WBGT
100%	DB + 4°F
90%	DB + 2°F
80%	DB
70%	DB - 3°F
60%	DB - 5°F
50%	DB - 7°F
40%	DB - 9°F

NOTE

This method may underestimate the actual WBGT for work performed directly adjacent to hot steam pipes or other radiant heat sources.

When the relative humidity is not known, use 100% value for estimation.

USING THE WET BULB GLOBE THERMOMETER

Measuring WBGT by using the Wet Bulb Globe thermometer will require entering the work area prior to the start of the job. Be sure to prepare the meter for use, prior to bringing it into the hot environment, in order to save time.

To prepare the meter:

1. Connect each of the wet bulb, dry bulb, and globe sensors to the unit. Look at the symbols located on the top of the unit to determine the appropriate connector for each sensor. Use caution to insure that the connector prongs are aligned properly in order to avoid damaging the sensors.
2. Use distilled water to saturate the sponge and wick on the wet bulb sensor.

To operate the meter:

1. Turn the meter on to the desired function; WBGT in for indoor measurements, or WBGT out for outdoor measurements.
2. Allow the sensors to stabilize in the environment where reading is being taken. Typical response times may be as Long as 15 minutes.
3. Take reading once display has stabilized.

Changing Batteries/Meter Calibration:

1. Consult owners manual.

HEAT STRESS PRE-JOB BRIEFING

Advise persons entering a heat stress area of the established stay time.

Advise persons entering a heat stress area of any required engineering controls or of any personal cooling device requirements, such as ice vests.

Advise persons entering a heat stress area:

- They may become dehydrated due to sweating.
- Lost body water and electrolytes should be replaced by drinking during rest breaks to prevent heat-related illness.
- Where they may obtain drinking water and/or Gatorade.
- Where cooler rest areas are located, and the duration of minimum recovery times.

First Aid for Heat Stress:

Heat Cramps - are muscle spasms due to a loss of salt through sweating. Leg, stomach, and back muscles are most often affected and are often a sign of approaching heat exhaustion. Cramps can also result from drinking large amounts of water without electrolytes (salt, sugar).

First Aid: Rest in cool area, drink water or Gatorade, and eat food high in salt content.

Heat Exhaustion - Condition caused by an insufficient flow of blood to the brain (blood is shunted to the skin to lose heat). Symptoms can include cool, pale clammy skin, weakness, dizziness, headache, nausea, and fainting.

First Aid: Rest in cool area, lie down, elevate feet, apply cool wet cloths, fan with air, and drink liquids.

Heat Stroke - a serious medical emergency caused by a failure of the body's cooling mechanisms. Symptoms include hot, dry skin (sweating stops), extremely high body temperatures, strong, rapid pulse, and unconsciousness.

First Aid: Immediate, rapid cooling of the body is necessary. Use safety showers, move air over the body with a fan or by fanning, or cover the body with a wet sheet. **Seek immediate medical attention.**

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM SRO-A.2

Review / Approve an Equipment Clearance (OPS-NGGC-1301)

CANDIDATE: ______________________________

EXAMINER: ______________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task: Review / Approve an Equipment Clearance (OPS-NGGC-1301)

Alternate Path: NONE

Facility JPM #: NEW

K/A Rating: 2.2.13 Importance: SRO 3.8 RO NA

K/A Statement: Knowledge of tagging and clearance tagging procedures.

Task Standard: Clearance is disapproved with all three (3) discrepancies identified.

Preferred Evaluation Location: Simulator X In Plant ________

Preferred Evaluation Method: Perform X Simulate ________

References: 5379-685, Sheet 3, CVCS Purification & Makeup
EDP-003, MCC-Buses
OPS-NGGC-1301, Equipment Clearance

Validation Time: 30 minutes Time Critical: NO

Candidate: ______________________________

Time Start: __________ Time Finish: _______

Performance Time: ________ minutes

Performance Rating: SAT ________ UNSAT ________

Comments: ____

____

Examiner: ______________________________ Date: _______
Signature

Tools/Equipment/Procedures Needed:

OPS-NGGC-1301
5379-685, Sheet 3
EDP-003

READ TO OPERATOR

DIRECTION TO CANDIDATE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

The unit is operating at 30% power.

The internals for CVC-397B, Boric Acid Transfer Pump 'B' Discharge Check Valve, must be replaced.

Boric Acid Transfer Pump 'B' has been secured and Pump 'A' is aligned for operation.

Mechanical Maintenance has submitted a clearance request. The clearance has been manually generated.

INITIATING CUES:

You are to review the Equipment Clearance Tag Sheet for CVC-397B and identify **EVERY** discrepancy which would prohibit approval.

NOTE: Individual tags have **NOT** been generated and are **NOT** part of the review process.

START TIME: ________

STEP 1:	Locates proper procedure and required information.	
STANDARD:	Locates OPS-NGGC-1301, EDP-003, and P&ID 5379-685, Sheet 3	
NOTES:	***NOTES:*** ***1) Provide candidate with Attachment 1, which includes the completed clearance forms.*** ***2) For clarity, the Steps in Section 9.2.1 are referenced, as applicable, in the JPM, but steps may be performed in any order provided the candidate identifies the required discrepancies.***	
COMMENTS:		____ SAT ____ UNSAT
STEP 2:	Secure pump/fan and hang a tag on its control switch (**Step 9.2.1.9.a**)	
STANDARD:	Verifies tag to be hung on Boric Acid Transfer Pump 'B' RTGB and local control switches	
NOTES:		
COMMENTS:		____ SAT ____ UNSAT

STEP 3:	Remove the power source for the pump/fan prime mover (open breaker, remove fuse, shut steam supply valve and so forth) and place tag on the power source (**Step 9.2.1.9.b**)	**CRITICAL STEP**
STANDARD:	Determines power supply to Boric Acid Transfer Pump 'B' is incorrectly identified as MCC-5, Breaker 9C (**ITEM #1 - SHOULD BE MCC-6**), AND determines that breaker is incorrectly tagged after tagging the discharge isolation valves (**ITEM #2 - SHOULD BE TAGGED BEFORE VALVES**)	
NOTES:	**CRITICAL TO IDENTIFY DISCREPANCIES TO AVOID APPROVAL OF IMPROPER CLEARANCE.**	____ SAT
COMMENTS:		____ UNSAT
STEP 4:	Reposition manual valves as required by the clearance and place tag on handwheels of the valves covered by the clearance. For pumps, shut the discharge valve before shutting the suction valve (**Step 9.2.1.9.e**)	
STANDARD:	Verifies discharge isolation valves properly identified and are SHUT before shutting the suction isolation valves - CVC-379, Boric Acid Transfer Pump 'B' Discharge - CVC-341, Boric Acid Transfer Pump 'B' Discharge to Filter - CVC-284B, Boric Acid Transfer Pump 'B' Discharge to BIT - CVC-349F, BA Pump "B" Disch Press PI-110 Root Isolation	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 5:	Reposition manual valves as required by the clearance and place tag on handwheels of the valves covered by the clearance. For pumps, shut the discharge valve before shutting the suction valve (**Step 9.2.1.9.e**)	**CRITICAL STEP**
STANDARD:	Verifies suction isolation valve CVC-334, Boric Acid Transfer Pump 'B' Suction, properly identified and SHUT after shutting the discharge isolation valves, but determines CVC-336, Primary Water to Boric Acid Transfer Pump 'B' Suction NOT included on clearance (**ITEM #3 - SHOULD BE ALSO TAGGED**)	
NOTES:	**CRITICAL TO IDENTIFY DISCREPANCIES TO AVOID APPROVAL OF IMPROPER CLEARANCE.**	____ SAT
COMMENTS:		____ UNSAT
STEP 6:	Systems, or portions of systems, and components that normally operate at temperatures and pressures above ambient should be vented and drained as necessary for the performance of work (**Step 9.2.1.24**)	
STANDARD:	Verifies drain path inside isolation boundaries to be CVC-379A, Boric Acid Transfer Pump 'B' Discharge Line Drain	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 7:	Systems, or portions of systems, and components that normally operate at temperatures and pressures above ambient should be vented and drained as necessary for the performance of work (**Step 9.2.1.24**)	
STANDARD:	Verifies vent path inside isolation boundaries to be CVC-334A, Boric Acid Transfer Pump 'B' Suction Line Vent	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
STEP 8:	Does NOT approve clearance	
STANDARD:	Does NOT approve clearance based on 3 items: 1) Incorrect power supply listed for pump 2) Pump discharge isolated before breaker tagged 3) Suction isolation valve missing from clearance	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
	END OF TASK	

STOP TIME: ________

ATTACHMENT 1 FOR JPM SRO-A.2

ATTACHMENT 3
Sheet 1 of 1
Operations Clearance Form

Clearance No. 01-99004

System No. 2060

1.0 Operations Approval

1.1 Equipment to be cleared CVC-397B, Boric Acid Pump 'B' Discharge Check Valve

1.2 Is a Tech Spec/ESF/Fire Protection System involved? Yes/No

T/S Ref. No

1.3 **Preparer's Signature** TODAY/
Prepared By Date / Time

1.4 **Reviewer's Signature** TODAY/
Verified By Date / Time

2.0 Authorization to hang: Equipment may be removed from service per Clearance Tag Sheet and required documents listed in 2.1 have been activated.

2.1 Tech Spec/ESF/Fire Protection System operability affected? Yes/No

Required Documents:

Authorized By SRO Date / Time

3.0 Clearance Hung. (Clearance Tag Sheet completed as requested)

Signature Date / Time

4.0 Clearance Accepted
Individual signing has verified clearance establishes adequate boundary

5.0 Clearance Completed
Equipment ready to be operated or remark made in the Special Instructions as to why not.

	Signature	Date/Time	Grounds Required	Signature	Date/Time	Grounds Removed
1			Y/N			Y/N
2			Y/N			Y/N
3			Y/N			Y/N
4			Y/N			Y/N
5			Y/N			Y/N
6			Y/N			Y/N
7			Y/N			Y/N

6.0 Authorization to Cancel: The individuals signing Step 4.0 must sign Step 5.0 before clearances canceled.

6.1 All work completed. Ground removal authorized.

Signature Date / Time

Restored Position and Order to be Restored sections prepared.

Signature Date / Time

6.2 Clearance removal authorized as per Tag Sheet and Precautions

SRO Date / Time

7.0 Review - Equipment Realigned as Required? Yes / NA

Clearance Removed from required documents? Yes / NA

OP V/E U/U Updated? Yes / NA

SRO Date / Time

Special Instructions

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ATTACHMENT 1 FOR JPM SRO-A.2

ATTACHMENT 4
Sheet 1 of 1
Operations Clearance Tag Sheet

Clearance No. 01-99004

Page 1 of 1

INT NAME (PRINT) INT NAME (PRINT)

* Independent Verification Required? YES NO If NO, N/A the Blocks
** N/A if Order is not Important

TAG TYPE AND #	** ORDER TO BE HUNG	COMPONENT ID/ LOCATION	CLR POSITION	ATTACHED BY (INITIAL)	IND VER	RESTORED POSITION	** ORDER TO BE RESTORED	REMOVED BY (INITIALS)*	IND VER *
1	1	'B' Boric Acid Transfer Pump / RTGB Cont Sw	Stop						
2	1	'B' Boric Acid Transfer Pump / Local Cont Sw	Stop						
3	2	CVC-379 / BAT Room	Shut						
4	2	CVC-341 / BAT Room	Shut						
5	2	CVC-284B / BAT Room	Shut						
6	2	CVC-349F / BAT Room	Shut						
7	3	52/MCC-5(9C) / E-1 Room	Off						
8	4	CVC-334 / BAT Room	Shut						
9	5	CVC-334A / BAT Room	Open						
10	5	CVC-379A / BAT Room	Cap Rem / Open						

Continued Y N

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

The unit is operating at 30% power.

The internals for CVC-397B, Boric Acid Transfer Pump 'B' Discharge Check Valve, must be replaced.

Boric Acid Transfer Pump 'B' has been secured and Pump 'A' is aligned for operation.

Mechanical Maintenance has submitted a clearance request. The clearance has been manually generated.

INITIATING CUES:

You are to review the Equipment Clearance Tag Sheet for CVC-397B and identify **EVERY** discrepancy which would prohibit approval.

NOTE: Individual tags have **NOT** been generated and are **NOT** part of the review process.

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM SRO-A.3

Review / Approve a Liquid Waste Release Permit (EMP-023)

CANDIDATE: ______________________________

EXAMINER: ______________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task: Review / Approve a Liquid Waste Release Permit (EMP-023)

Alternate Path: NONE

Facility JPM #: ADM-09

K/A Rating: 2.3.6 Importance: SRO 3.1 RO NA

K/A Statement: Knowledge of the requirements for reviewing and approving release permits.

Task Standard: Liquid release permit is disapproved with both discrepancies noted.

Preferred Evaluation Location: Simulator X In Plant ____

Preferred Evaluation Method: Perform X Simulate ____

References: EMP-023, Liquid Waste Release and Sampling

Validation Time: 30 minutes Time Critical: NO

Candidate: ____________________

Time Start: ______ Time Finish: ______

Performance Time: ______ minutes

Performance Rating: SAT ______ UNSAT ______

Comments: ____________________

____

Examiner: ____________________ Date: ______
Signature

Tools/Equipment/Procedures Needed:

EMP-023
Attachment 1 (2 pages) is to be given to candidate.
Attachment 2 (4 pages) is to be given to candidate ONLY if requested.

READ TO OPERATOR

DIRECTION TO CANDIDATE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

A release of Monitor Tank 'A' is scheduled to be performed.

The Release Permit has been completed and submitted for Superintendent Shift Operations approval.

INITIATING CUES:

You are to review the attached Release Permit in accordance with EMP-023, "Liquid Waste Release and Sampling," and identify **EVERY** discrepancy which would prohibit approval.

START TIME: ________

STEP 1: Locates proper procedure and required information STANDARD: Locates EMP-023 and completed Liquid Release Permit NOTES: ***NOTE: Provide candidate Liquid Release Permit (Attachment 1 to JPM) with INITIATING CUE.*** ***Attachment 2 (4 pages) should be given to candidate ONLY if requested.*** ***EMP-023, Section 8.5, provides instructions for the completion Liquid Release Permit.*** ***For clarity of completion of this JPM, the JPM will be approached as though the Release Permit were being completed, instead of reviewed.*** COMMENTS:	____ SAT ____ UNSAT
STEP 2: Obtain the "Gamma Spectroscopy Analysis" report and the "Pre-Release Permit" from the printer. Circle the particular tank (for batch releases) on the "Pre-Release Permit." (**Step 8.5.1**) STANDARD: Verifies analysis and pre-release permit are attached and verifies correct tank circled on Release Permit NOTES: ***NOTE: Provide Attachment 2 if requested. This is normally completed by Chemistry and not included with paperwork to be signed by SSO.*** COMMENTS:	____ SAT ____ UNSAT

STEP 3:	Obtain a Liquid Waste Release Permit (ATTACHMENT 10.3) and add the following data to the top of the form: 1. Release number - as listed on Page 1 of the Pre-Release Permit 2. Sample Submission Number (SSN). 3. Date (**Step 8.5.2**)	
STANDARD:	Verifies correct data transferred from pre-release permit to release permit	
NOTES:	***NOTE: Provide Attachment 2 if requested. This is normally completed by Chemistry and pre-release permit is not included with paperwork to be signed by SSO.***	____ SAT
COMMENTS:		____ UNSAT
STEP 4:	For Batch Releases (ATTACHMENT 10.3), enter the following information as appropriate in Part I, Release Information: Circle the appropriate Waste Condensate Tank, Monitor Tank, or Steam Generator, or write in another appropriate release pathway in the "Other" blank (**Step 8.5.4.1**)	
STANDARD:	Verifies correct data transferred from pre-release permit to release permit	
NOTES:	***NOTE: Provide Attachment 2 if requested. This is normally completed by Chemistry and pre-release permit is not included with paperwork to be signed by SSO.***	____ SAT
COMMENTS:		____ UNSAT

STEP 5:	Enter the estimated release start/stop dates and times as referenced on Page 1, Part I: Pre-Release Information, of the generated Pre-Release Permit (**Step 8.5.4.2**)	
STANDARD:	Verifies correct data transferred from pre-release permit to release permit	
NOTES:	***NOTE: Provide Attachment 2 if requested. This is normally completed by Chemistry and pre-release permit is not included with paperwork to be signed by SSO.***	____ SAT
COMMENTS:		____ UNSAT
STEP 6:	CAUTION: Do not use Unit #1 Circulating Water Pumps without an official letter from Unit #1 Operations (**Caution before Step 8.5.4.3**)	
STANDARD:	Acknowledges caution	
NOTES:	***NOTE: Not applicable due to using Unit 2 CW.***	____ SAT
COMMENTS:		____ UNSAT

STEP 7:	Dilution Flow Data - Circle which unit circulating water pumps are to be used for dilution and the number of these pumps used for this release rate calculation. Enter the dilution rate for this configuration as listed on ATTACHMENT 10.1 (**Step 8.5.4.3**)	**CRITICAL STEP**
STANDARD:	Determines dilution flow rate should be 250,000 gpm from Attachment 1 instead of 400,000 gpm	
NOTES:	**CRITICAL TO IDENTIFY THAT DILUTION FLOW RATE IS NOT CORRECT.** ***NOTE: Incorrect dilution flow rate determined by using 3 pump value for Unit 2 instead of 2 pump value.***	
COMMENTS:		____ SAT ____ UNSAT

STEP 8:	Release Rate Data - Enter the Maximum Release Rate for the dilution rate above. This value may be obtained from Part II, Pre-Release Calculations under the heading MAX WASTE (GPM) of the generated Pre-Release Permit. If this value exceeds MAX design flow rate of this discharge pathway (see ATTACHMENT 10.1), enter only the MAX design flow rate. Otherwise, record the value obtained from the Pre-Release Permit (**Step 8.5.4.4**)	
STANDARD:	Verifies correct data transferred from pre-release permit to release permit and are within limits	
NOTES:	***NOTE: Provide Attachment 2 if requested. This is normally completed by Chemistry and pre-release permit is not included with paperwork to be signed by SSO.***	____ SAT
COMMENTS:		____ UNSAT
STEP 9:	Monitor Data - Enter the radiation monitor name and setpoint from the Pre-Release Permit, MAX SETPOINT CPM corresponding to the appropriate dilution flowrate (**Step 8.5.4.5**)	
STANDARD:	Verifies correct data transferred from pre-release permit to release permit	
NOTES:	***NOTE: Provide Attachment 2 if requested. This is normally completed by Chemistry and pre-release permit is not included with paperwork to be signed by SSO.***	____ SAT
COMMENTS:		____ UNSAT

STEP 10:	Obtain the dose projection (31 day) from the generated Pre-Release Permit and enter the following Dose Assessment information in Part I, Pre-Release Information: Total-Body percent of this limit - enter this value which may be obtained from the generated Pre-Release Permit, Cumulative Dose For Unit 2 (mrem), under the header TOT-BODY by the label % 31 DAY LIMIT (**Step 8.5.4.6.a**)	
STANDARD:	Verifies correct data transferred from pre-release permit to release permit	
NOTES:	***NOTE: Provide Attachment 2 if requested. This is normally completed by Chemistry and pre-release permit is not included with paperwork to be signed by SSO.***	____ SAT
COMMENTS:		____ UNSAT
STEP 11:	Organ percent of this limit - enter the organ having the highest 31 day dose contribution, and percent of 31 day limit for this organ. This may be obtained from the generated Pre-Release Permit, Cumulative Dose For Unit 2 (mrem), under the header for the organ (example: Liver) by the label 31D AFTER RELEASE and % 31 DAY LIMIT (**Step 8.5.4.6.b**)	
STANDARD:	Verifies correct data transferred from pre-release permit to release permit	
NOTES:	***NOTE: Provide Attachment 2 if requested. This is normally completed by Chemistry and pre-release permit is not included with paperwork to be signed by SSO.***	____ SAT
COMMENTS:		____ UNSAT

STEP 12:	Obtain the 10CFR50 Quarterly Dose Totals and enter the following Dose Assessment information in Part I, Pre-Release Information: Total Body percent of this limit - enter this value which may be obtained from the generated Pre-Release Permit, Cumulative Dose For Unit 2 (mrem), under the header TOT-BODY by the label % QUARTER LIMIT (**Step 8.5.4.7.a**)	
STANDARD:	Verifies correct data transferred from pre-release permit to release permit	
NOTES:	***NOTE: Provide Attachment 2 if requested. This is normally completed by Chemistry and pre-release permit is not included with paperwork to be signed by SSO.***	____ SAT
COMMENTS:		____ UNSAT
STEP 13:	Organ percent of this limit - Enter the organ having the highest quarterly dose contribution, and percent of quarter limit for this organ. This may be obtained from the generated Pre-Release Permit, Cumulative Dose For Unit 2 (mrem), under the header for the organ (example: Liver) by the label QTR AFTER RELEASE and % QUARTER LIMIT (**Step 8.5.4.7.b**)	
STANDARD:	Verifies correct data transferred from pre-release permit to release permit	
NOTES:	***NOTE: Provide Attachment 2 if requested. This is normally completed by Chemistry and pre-release permit is not included with paperwork to be signed by SSO.***	____ SAT
COMMENTS:		____ UNSAT

STEP 14:	Obtain the 10CFR50 Annual Dose Totals and enter the following Dose Assessment information in Part I, Pre-Release Information: Total-Body and percent of this limit - enter this value which may be obtained from the generated Pre-Release Permit, Cumulative Dose For Unit 2 (mrem), under the header TOT-BODY by the label % ANNUAL LIMIT (**Step 8.5.4.8.a**)	
STANDARD:	Verifies correct data transferred from pre-release permit to release permit	
NOTES:	***NOTE: Provide Attachment 2 if requested. This is normally completed by Chemistry and pre-release permit is not included with paperwork to be signed by SSO.***	____ SAT
COMMENTS:		____ UNSAT
STEP 15:	Organ percent of this limit - Enter the organ having the highest annual dose contribution, and percent of annual limit for this organ. This may be obtained from the generated Pre-Release Permit, Cumulative Dose For Unit 2 (mrem), under the header for the organ (example: LIVER) by the label ANN AFTER RELEASE and % ANNUAL LIMIT (**Step 8.5.4.8.b**)	
STANDARD:	Verifies correct data transferred from pre-release permit to release permit	
NOTES:	***NOTE: Provide Attachment 2 if requested. This is normally completed by Chemistry and pre-release permit is not included with paperwork to be signed by SSO.***	____ SAT
COMMENTS:		____ UNSAT

STEP 16:	For Radwaste Treatment System Operability, initial in the appropriate blank to document whether the Radwaste Treatment System is operable or inoperable (**Step 8.5.4.9**)	
STANDARD:	Verifies that initial is included stating system is operable	
NOTES:	***NOTE: Provide Attachment 2 if requested. This is normally completed by Chemistry and pre-release permit is not included with paperwork to be signed by SSO.***	____ SAT
COMMENTS:		____ UNSAT
STEP 17:	Record the pH of the tank sampled in the appropriate blank (**Step 8.5.4.10**)	
STANDARD:	Verifies that pH is entered and is above the limit	
NOTES:	***NOTE: Provide Attachment 2 if requested. This is normally completed by Chemistry and pre-release permit is not included with paperwork to be signed by SSO.***	____ SAT
COMMENTS:		____ UNSAT

STEP 18:	Review the LIQUID WASTE RELEASE PERMIT and ensure the release can be made within applicable limits as listed on the form (refer to Section 3.1 of this procedure.) Sign the "Prepared By" blank on the Liquid Waste Release Permit (**Step 8.5.5**)	
STANDARD:	Verifies that signature is in place on release permit	
NOTES:	***NOTE: Only need to determine that signature is in place. Discrepancies are identified in other steps.***	____ SAT
COMMENTS:		____ UNSAT
STEP 19:	If the release requires E&C Supervisor Approval, per Section 3.1, the E&C Supervisor or the E&C Supervisor's designee signs the Liquid Waste Release Permit under "Release Approval". If E&C Supervisor's signature is not required, N/A this blank (**Step 8.5.6**)	**CRITICAL STEP**
STANDARD:	Determines release requires E&C Supervisor approval due to exceeding 50% of quarterly 10CFR20 limit for total body dose	
NOTES:	**CRITICAL TO IDENTIFY THAT SUPERVISOR SIGNATURE IS REQUIRED.**	____ SAT
COMMENTS:		____ UNSAT

STEP 20:	If release is a batch release, route the Liquid Waste Release Permit (ATTACHMENT 10.3) to the Shift Superintendent. The Shift Superintendent then reviews the permit and signs by "Approved for Release" (**Step 8.5.8**)	**CRITICAL STEP**
STANDARD:	Disapproves Release Permit due to 2 previously identifed items: 1) Incorrect dilution flow rate 2) Release permit also requires E&C Supervisor approval	
NOTES:	**CRITICAL TO NOT ISSUE APPROVAL OF RELEASE PERMIT.**	____ SAT
COMMENTS:		____ UNSAT
	END OF TASK	

STOP TIME: ________

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

A release of Monitor Tank 'A' is scheduled to be performed.

The Release Permit has been completed and submitted for Superintendent Shift Operations approval.

INITIATING CUES:

You are to review the attached Release Permit in accordance with EMP-023, "Liquid Waste Release and Sampling," and identify **EVERY** discrepancy which would prohibit approval.

JPM SRO-A.3 ATTACHMENT 1

Title: R0551

ATTACHMENT 10.3
Page 1 of 2

LIQUID WASTE RELEASE PERMIT (BATCH RELEASES)

RELEASE NUMBER: **0100XX-L** SSN: **204** DATE: **TODAY**

This revision is the latest revision available as verified by:

JEFF JONES	JJ	Jeff Jones	TODAY
Name (Print)	Initial	Signature	Date

PART I: RELEASE INFORMATION (E&C)					
Waste Condensate Tank: A B C D E Monitor Tank: A B S/G Drainage: A B C Other.................______			Estimated Release Start TODAY (Date Time) Estimated Release Stop TODAY (Date Time)		
10CFR20 Compliance					
Dilution Flow Data			Release Rate Data	Monitor Data	
Unit Involved[1]	No. of Pumps	Dilution Flow (GPM)	Max. Release Rate (GPM)	Monitor Name	Setpoint (CPM)
1 or 2	1, 2, or 3	4.0000E5	4.2390E1	R-18	3.8217E6
DOSE ASSESSMENT					
31 DAY DOSE PROJECTION		10CFR50 QUARTERLY LIMIT		10CFR50 ANNUAL LIMIT	
ORGAN	% LIMIT	ORGAN	% LIMIT	ORGAN	% LIMIT
LIVER	7.26%	THYROID	37.82%	THYROID	22.20%
TOTAL BODY	21.46%	TOTAL BODY	51.04%	TOTAL BODY	26.63%
Radwaste Treatment System:[2] Operable JJ Inoperable ______ (Init.)					(CR 99-01075)
Tank pH:	7.2	NPDES pH limit: ≥ 6.0			(CR 99-01699)

NOTE: DO NOT USE UNIT #1 CIRCULATING WATER PUMPS WITHOUT AN OFFICIAL LETTER FROM UNIT #1 OPERATIONS.

Release requires E&C Supervisor Approval if: (1) Any 31 day dose projection limit exceeds 90%, or (2) Any 10CFR50 Quarterly Limit exceeds 50% or (3) Any 10CFR50 Annual Limit exceeds 50%.

Prepared By: Jeff Jones

Release Approval

E&C Supervisor: N/A

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JPM SRO-A.3 ATTACHMENT 1

ATTACHMENT 10.3
Page 2 of 2

LIQUID WASTE RELEASE PERMIT (BATCH RELEASES)

Release # 0100XX-L

PART II: RADIATION MONITOR INFORMATION[1] (OPS and E&C)		(CR 98-00002)
Reading	R-18	R-19 ( )
Prior[4]	CPM	CPM
Source Check[5]	OPS INI.	E&C INI.
Setpoint Verified at[6]	CPM	CPM
Status Board Updated	OPS INI.	OPS INI.
Monitor Reading During Release	CPM	CPM
Monitor Reading After Release	CPM	CPM

Approved for Release: ______________________________ (CR 97-00059)
(Superintendent Shift Ops)

PART III: RELEASE INFORMATION[1] (OPS)				(CR 98-00002)
Number of Circulating Water Pumps in Service: ______ [Unit 1 or 2] (circle one)				
Release	Date	Time	Tank or SG Level	Integrator
Start				
Stop				
Difference		MIN.	GAL.	GAL.
FI-1064 (GPM)[3]		Actual Release Rate (GPM)		

1. N/A all blanks not applicable.
2. If quarterly % of limit is ≥ 13 % to the total body or ≥ 12% to any organ, see ODCM Specification 2.9.1 and 2.9.2.
3. If FI-1064 is out of service, estimate flow every 4 hours.
4. If Rad Monitor is out of service, refer to Section 7.0 of EMP-023.
5. Source check required prior to each batch release via R-18 or R-19 A, B, or C .
6. Log actual value which the setpoint was changed to.
7. If any limit is exceeded, make immediate notification to the Superintendent Shift Operations and the E&C Supervisor

Rad Monitor Information Completed By: ______________________
(R-18: Control OPS, or R-19: E&C Tech)

Release Information Completed By: ______________/______________
(Aux. OPS/Control OPS)

Reviewed By: ______________________________
(Shift Superintendent)

POST RELEASE REVIEW

Release Posted By: ______________________________ Date: __________

Sample Composited By: ______________________________ Date: __________

______________ ______________ ______________ ______________
Reviewed By Date E&C Supervisor Date

JPM SRO-A.3 ATTACHMENT 2

CAROLINA POWER AND LIGHT COMPANY page 1 of 4
ROBINSON S.E.G PLANT
LIQ PROC NAME
Liquid Radioactive Release Permit 0100XX-L
Pre-Release Supplementary Data

PART I: PRE-RELEASE DATA

RELEASE POINT (2): MONITOR TANKS A / B
DISCHARGE POINT (1): WASTE DISPOSAL SYSTEM
Dilution Stream (1): DISCHARGE CANAL

Permit Issued: TODAY
Release Type: Batch

Waste Tank Volume: 1.0000E+04 GAL
Recirc. Start: TODAY 01:00:00
Sample After: TODAY 02:01:00
Recirc. Rate: 6.0000E+01 GPM
Min Recirc Time: 61 MIN
Agitator Used:

Rad Monitor: (R-18) (N/A)
Rad Monitor Bckgrnd: 1.1200E+04 CPM 0.0000E+00

Estim. Dilution Flow: 4.0000E+05 GPM
Estim. Dilution Vol.: 1.0000E+08 GAL
Dilution Factor (Act): 2.5010E+03
Estim. Release Start: TODAY
Estim. Release End: TODAY
Estim. Waste Flow: 4.0000E+01 GPM
Estim. Waste Vol.: 1.0000E+04 GAL
Estim. Duration: 250.00 MIN

PART II: PRE-RELEASE CALCULATIONS

Sample Entry # : 204
Sample time: TODAY
Configuration File Name: N/A
Sampled by: JONES

Total Waste Activity: 4.4668E+01 Curies
Total Waste Conc/ECL: 1.1800E+03
Dilution Allocation: 2.5000E-01
Min Dilution Flow: 3.7745E+05 GPM
Dilution Strm Sample: 0
Max Monitor Setpoint: 1.4009E-02 uCi/ml
3.8217E+06 CPM

Total Waste Conc: 1.1800E+00 uCi/ml
Total Gamma Conc: 4.0752E-06
Concurrent Releases: 1
Max Waste Flow: 4.0000E+01 GPM
Dilution Conc/ECL: 4.7182E-01
Flag:
Rqrd Dilution Fct: 2.3600E+03

Setpoint data for other dilution flow rates:

Dilution (GPM)	Max Waste (GPM)	Setpoint (uCi/ml)	Setpoint (CPM)	Flag
5.0000E+04	5.2987E+00	0.0000E+00	1.1200E+04 (MAX)	F
1.6000E+05	1.6956E+01	0.0000E+00	1.1200E+04 (MAX)	F
2.5000E+05	2.6494E+01	0.0000E+00	1.1200E+04 (MAX)	F
4.0000E+05	4.2390E+01	1.4009E-02	3.8217E+06 (MAX)	

Flags: F- Waste Flow > Max Allowable

JPM SRO-A.3 ATTACHMENT 2

CAROLINA POWER AND LIGHT COMPANY
ROBINSON S.E.G PLANT
LIQ PROC NAME
Liquid Radioactive Release Permit

page 2 of 4

0100XX-L

Pre-Release Supplementary Data

ISOTOPIC IDENTIFICATION - Unit 2

ISOTOPE		Pre-Dilut Measured uCi/ml	Pre-Dilut Measured Conc/ECL	Pre-Dilut Measured Conc/Total	Post Dilution uCi/ml	Post Dilution Conc/ECL	Estimated Curies Released
CO-57	P	1.12E-08	1.87E-04	9.49E-09	4.48E-12	7.46E-08	4.24E-07
FE-55	O	4.13E-07	4.13E-03	3.50E-07	1.65E-10	1.65E-06	1.56E-05
H-3	O	1.18E+00	1.18E+03	1.00E+00	4.72E-04	4.72E-01	4.47E+01
XE-133	N	4.06E-06	2.03E-02	3.44E-06	1.62E-09	8.12E-06	1.54E-04
Totals		1.18E+00	1.18E+03		4.72E-04	4.72E-01	4.47E+01

JPM SRO-A.3 ATTACHMENT 2

CAROLINA POWER AND LIGHT COMPANY
ROBINSON S.E.G PLANT
LIQ PROC NAME
Liquid Radioactive Release Permit

page 3 of 4

0100XX-L

Pre-Release Supplementary Data

Dose Calculation by Isotope (mrem) from This Release

Unit 2

Isotope	:Bone	:Liver	:Tot-body	:Thyroid	:Kidney	:Lung	:GI-LLI
CO-57	:4.73E-11	:1.35E-10	:2.10E-10	:4.73E-11	:4.73E-11	:4.73E-11	:2.53E-09
FE-55	:1.13E-07	:7.84E-08	:1.83E-08	:0.00E+00	:0.00E+00	:4.37E-08	:4.50E-08
H-3	:0.00E+00	1.11E-01:	:1.11E-01	:1.11E-01	:1.11E-01	:1.11E-01	:1.11E-01
Totals	:1.13E-07	:1.11E-02	:1.11E-02	:1.11E-02	:1.11E-02	:1.11E-02	:1.11E-02

JPM SRO-A.3 ATTACHMENT 2

CAROLINA POWER AND LIGHT COMPANY
ROBINSON S.E.G PLANT
LIQ PROC NAME
Liquid Radioactive Release Permit

page 4 of 4

0100XX-L

Pre-Release Supplementary Data

Report Category : Cumulative Maximum Individual Dose (mrem) for
: Controlling Age Group at Controlling Location
Type of Activity : Radioiodines and Particulates
Age Group & Pathway(s) : Adult , sff wr
Location : NE at 6.760 km.
Unit number : 2

	Bone	Liver	Tot body	Thyroid	Kidney	Lung	GI-LLI
This Release	1.13E-07	1.11E-02	1.11E-02	1.11E-02	1.11E-02	1.11E-02	1.11E-02
31D Prior To Rel	3.42E-07	3.42E-03	3.28E-03	3.28E-03	3.28E-03	3.28E-03	3.28E-03
31D After Release	4.56E-07	1.45E-02	1.44E-02	1.44E-02	1.44E-02	1.44E-02	1.44E-02
31 Day Limit	2.00E-01	2.00E-01	6.70E-02	2.00E-01	2.00E-01	2.00E-01	2.00E-01
% 31 Day Limit	0.00%	7.26%	21.46%	7.20%	7.20%	7.20%	7.20%
Qtr Prior To Rel	6.06E-06	6.89E-01	7.54E-01	1.86E+00	1.86E+00	1.86E+00	1.86E+00
Qtr After Release	6.18E-06	7.00E-01	7.66E-01	1.89E+00	1.88E+00	1.88E+00	1.88E+00
Quarterly Limit	5.00E+00	5.00E+00	1.5E+00	5.00E+00	5.00E+00	5.00E+00	5.00E+00
% Quarter Limit	0.00%	14.00%	51.04%	37.82%	37.63%	37.63%	37.63%
Ann Prior To Rel	8.92E-05	9.86E-01	7.88E-01	2.18E+00	2.18E+00	2.18E+00	2.18E+00
Ann After Release	8.93E-05	9.97E-1	7.99E-01	2.22E+00	2.19E+00	2.19E+00	2.19E+00
Annual Limit	1.00E+01	1.00E+01	3.00E+00	1.00E+01	1.00E+01	1.00E+01	1.00E+01
% Annual Limit	0.00%	9.97%	26.63%	22.20%	21.90%	21.90%	21.90%

CP&L

R
Reference Use

CAROLINA POWER & LIGHT COMPANY
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 5
PART 5

ENVIRONMENTAL MONITORING PROGRAM

EMP-023

LIQUID WASTE RELEASE AND SAMPLING

REVISION 31

SUMMARY OF CHANGES

STEP/SECTION	REVISION COMMENTS
Entire Procedure	Update to AP-007 standards.
8.5.4.5	Add a "CAUTION" statement to limit the release setpoints for batch liquid releases. (CR 00-017916)

TABLE OF CONTENTS

1.0 PURPOSE

1.1 This procedure describes the sample locations, lower limits of detection (LLDs), and methods to be used in generating liquid waste release permits to ensure that liquid radioactive effluents from the H. B. Robinson Unit #2 SEG Plant are maintained As Low As Reasonably Achievable (ALARA) and within the H. B. Robinson Technical Specifications.

2.0 REFERENCES

2.1 H. B. Robinson Technical Specifications Sections 5.5.4.b, 5.5.4.c, 5.5.4.d, and 5.5.4.e.

2.2 H. B. Robinson Steam Electric Plant, Unit 2, Off-site Dose Calculation Manual (ODCM) Sections 2.0, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 6.0, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, and 9.3.

2.3 Updated FSAR, Sections 11.2, and 11.5.

2.4 10CFR20, Appendix B

2.5 10CFR50, Appendix I

2.6 Canberra Nuclear Effluent Management System Operator's Manual, Number 07-0610, May 1994

2.7 STSS, Surveillance Test Scheduling System

2.8 NRC Inspection Manual, Inspection Procedure 84750, "Radioactive Waste Treatment, and Effluent and Environmental Monitoring" (Confirmatory Measurements)

2.9 CP-003, Systems Sampling Procedure

2.10 EMP-006, NPDES Program

2.11 EMP-019, Liquid and Gaseous Effluent Composite Preparation and Update

2.12 EMP-024, RETS Surveillance

2.13 EMP-027, Operation of GA Monitors R-37 and R-19A, B, and C

2.14 PLP-100, Technical Requirements Manual (TRMS), TRMS 3.19, TR 3.19.1

2.15 NGG Procedure CSP-NGGC-2502

2.16 ACR 93-488

2.17 ACR 94-00505

2.18 ACR 94-01704

2.19 CR 96-01043

2.20 CR 96-01044

2.21 CR 97-00059

2.22 CR 98-00002

2.23 CR 98-02437

2.24 CR 99-01075

2.25 CR 99-01699

3.0 RESPONSIBILITIES

3.1 A Liquid Waste Release Permit does **NOT** need the E&C Supervisor's approval, or the E&C Supervisor's designee, **IF** it is in compliance with release rate requirements (10CFR20 limits) and dose requirements (10CFR50 Appendix I limits), as stated in Section 7.0 of this procedure, and with the following requirements:

- % of 31 day dose limit may **NOT** exceed 90% for any organ or total body limit. This value is found in the "Pre-Release Permit" report.
- % quarterly dose limit may **NOT** exceed 50% of the quarterly dose limit for any organ or total body limit (see Section 7.2). This value is found in the "Pre-Release Permit" report.
- % annual dose limit may **NOT** exceed 50% of the annual dose limit for any organ or total body limit (see Section 7.2). This value is found in the "Pre-Release Permit" report.

3.2 The E&C Supervisor, or the E&C Supervisor's designee, **SHALL APPROVE** all Liquid Waste Release Permits prior to release **IF** any of the above requirements are exceeded.

3.3 The Operations Unit is responsible for completion of Part III (Release Information) and Part II (Radiation Monitor Information) of the Liquid Waste Release Permit (Batch Releases) and for assuring that actual release conditions for these releases are in compliance with Section 7.0 of this procedure. E&C personnel **WILL COMPLETE** the Source Check and Setpoint Verification portions of Part II (Radiation Monitor Information) section for steam generator drainage releases (Batch Releases). (CR97-00059)

4.0 PREREQUISITES

4.1 Normally, Node RNVX01 will be used for effluent processing. **IF** Node RNVX01 is unavailable, **CONTACT** an E&C Supervisor or assigned system manager(s) for instructions on using Node RNVS03 to run EMS.

4.2 Prior to sampling any effluent batch tank or Steam Generator, for batch release drainage, operations **MUST SUBMIT** a "Batch Liquid Sample Request" form (ATTACHMENT 10.2). The E&C Technician is cautioned to ensure a minimum one-hour recirculation prior to sampling any effluent batch tank.

4.3 Prior to generating a Pre-Release Permit, samples are to be collected as per appropriate sample collection procedure(s).

4.4 Prior to initiating a batch liquid release permit for any effluent batch tank or Steam Generator for batch release drainage, the tank pH **SHALL** be verified to be ≥ 6.0 (See EMP-006).

4.5 Passwords for sign-on and various EMS editors may be obtained from an E&C Supervisor or assigned system manager(s).

5.0 PRECAUTIONS AND LIMITATIONS

5.1 User should **CHECK** date and time to ensure they are correct on the system.

5.2 This procedure sets forth methods by which the applicable tasks may be performed. Other methods are available and may be used by those operators who have the necessary privileges and permissions assigned to their user ID. Any methods performed outside this procedure **SHALL** be done in accordance with vendor manuals and with concurrence of the assigned system manager(s) or the E&C Supervisor, or the E&C Supervisor's designee.

5.3 Proper sampling is essential **IF** representative results are to be expected. This procedure outlines sampling steps to be followed for assurance of representative samples. All routine sampling points are covered in this procedure, **HOWEVER** at times non-routine sampling may be requested. In this situation, the E&C Technician should **CONSULT** the E&C Supervisor and/or Operations for instructions on sampling these systems.

5.4 Only one pre-release permit may be opened at a time from the waste disposal system discharge point.

5.5 Only one pre-release permit may be opened at a time from each release point (see ATTACHMENT 10.1).

5.6 In order to comply with ODCM Table 2.8-1 for required Lower Limits of Detection (LLD) of principle gamma emitters, I-131, and dissolved and entrained noble gases, the suggested counting geometry should be the 1,000 milliliter Marinelli Beaker. The maximum time from mid-point in sample collection and analysis (ΔT) **SHALL NOT** exceed the time limit determined by LLD Confirmation per RCP-142.

5.7 The quantity of radioactive material contained in each of the following tanks **SHALL** be determined to be within the limits of Technical Requirements Manual Specification (TRMS) 3.19 ($\leq$ 10 Curies) by either analyzing a representative sample of the tank's contents when radioactive materials are being added to the tank or sampling the evaporator / demineralization system output when adding it to the tank.

- "A" Monitor Tank
- "B" Monitor Tank
- "C" Waste Condensate Tank
- "D" Waste Condensate Tank
- "E" Waste Condensate Tank
- Any outside temporary tank (a tank having a capacity of $\geq$100 gallons used for the receipt or transfer of radioactive liquids).

Radioactive materials added to the above tanks, via normal pathways (evaporator / demineralization systems) are monitored by conductivity measurements and/or periodic gamma analysis of evaporator distillate or demineralization system effluent. The pre-release permit also calculates the tank Curie content an prints a flag warning **IF** the above limit is exceeded; therefore, compliance with the above limit is met when liquid additions to the above tanks are added via normal operation.

5.8 A Pre-Release permit is generated to ensure compliance with 10CFR20 dose limits at site boundary and with 10CFR50, Appendix I, dose limits. The Post-Release permit documents the actual release conditions, concentrations, and radiological impact as described in the Pre-Release permit.

5.9 Independent Sampling and Analysis and Release Rate Calculations may be accomplished repeating Section 8.1. Be sure to label first permit generation as "Release Rate Calculations from Sample #1," and the second permit generation as "Release Rate Calculations from Sample #2." Only one Liquid Waste Release Permit will be issued using the most conservative analysis.

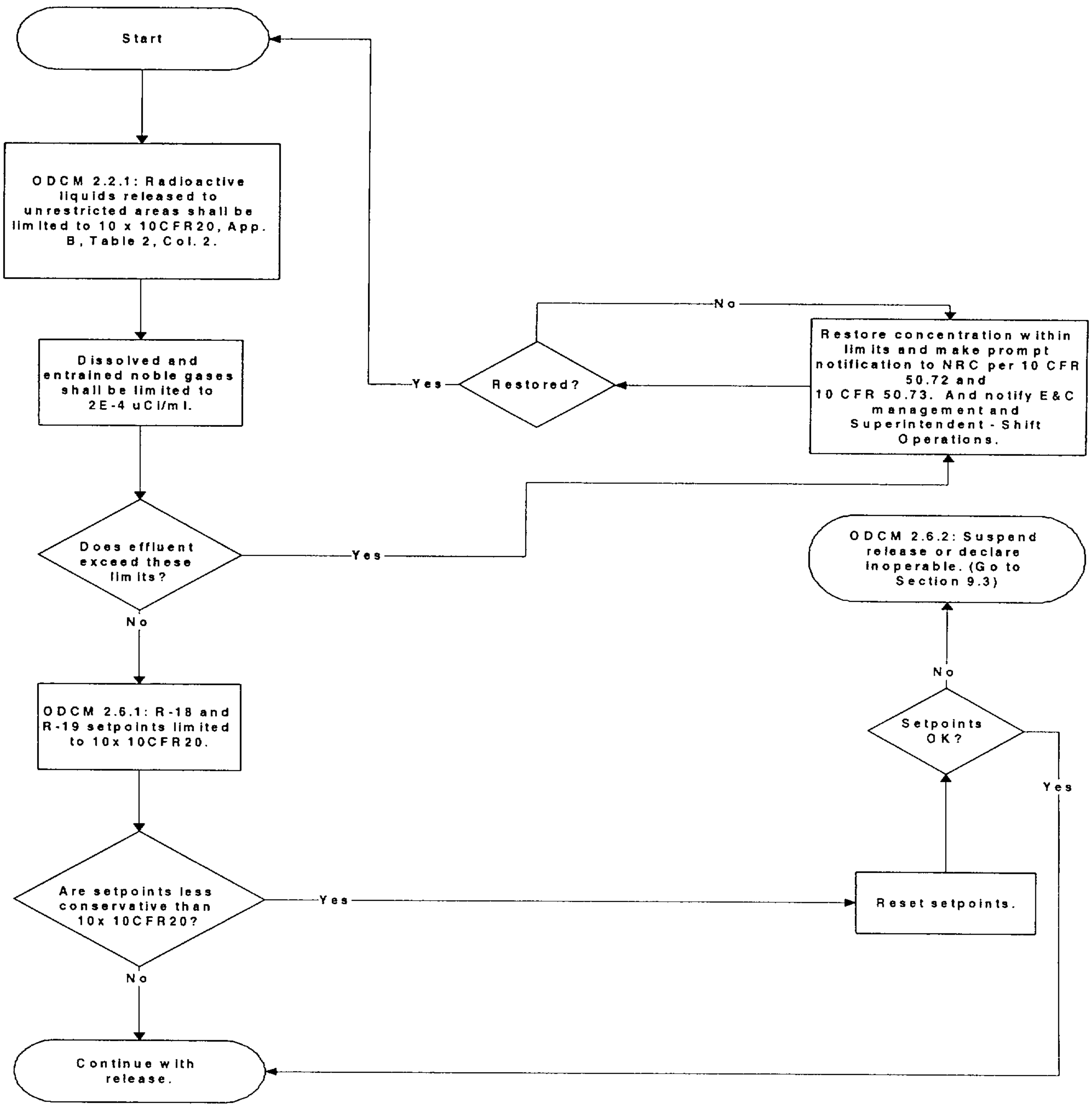
6.0 SPECIAL TOOLS AND EQUIPMENT

6.1 Gamma spectrometer and associated equipment.

6.2 DEC / VAX based computer system compatible with CAS / EMS software.

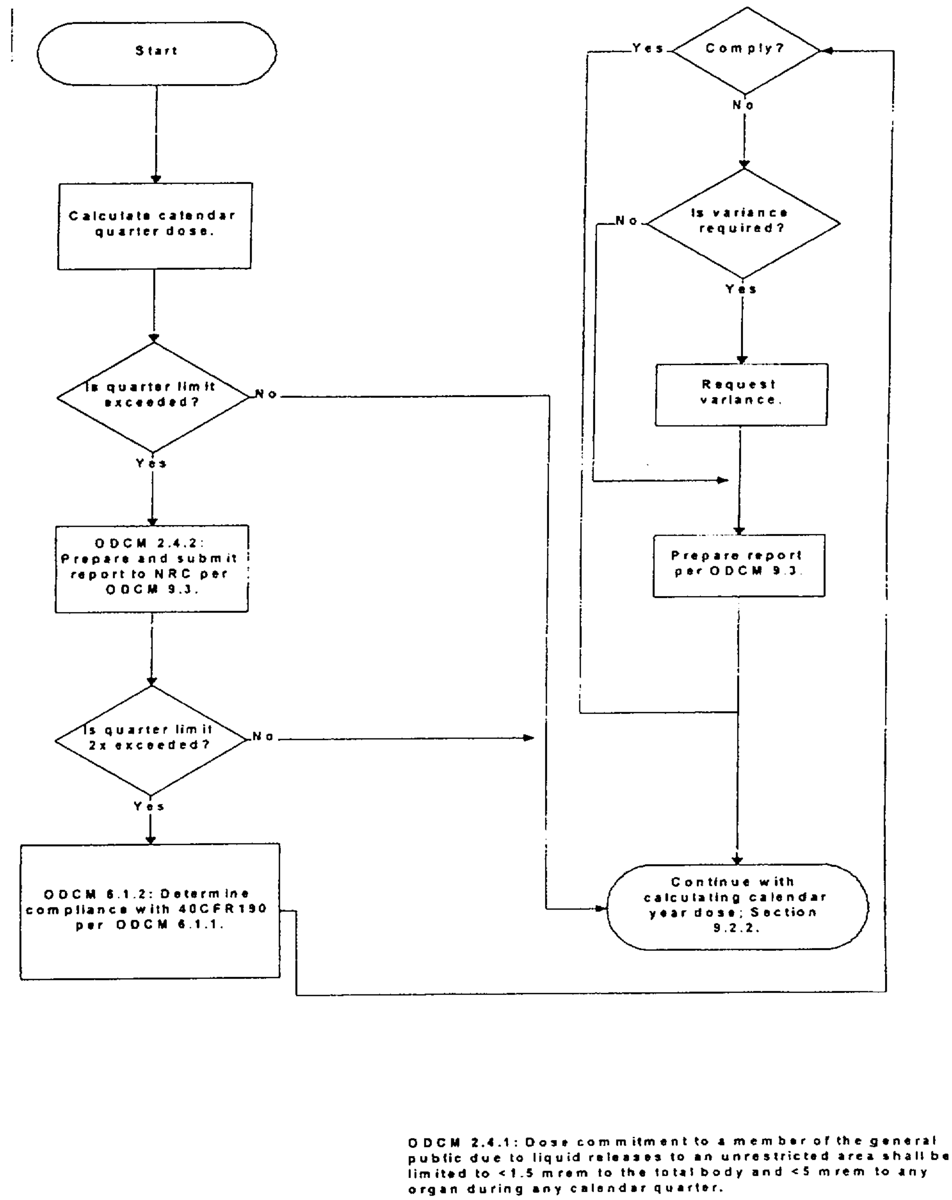
7.0 **ACCEPTANCE CRITERIA**

7.1 Compliance With 10CFR20 - Radioactive Materials in Liquid Effluents (ODCM Specification 2.2)

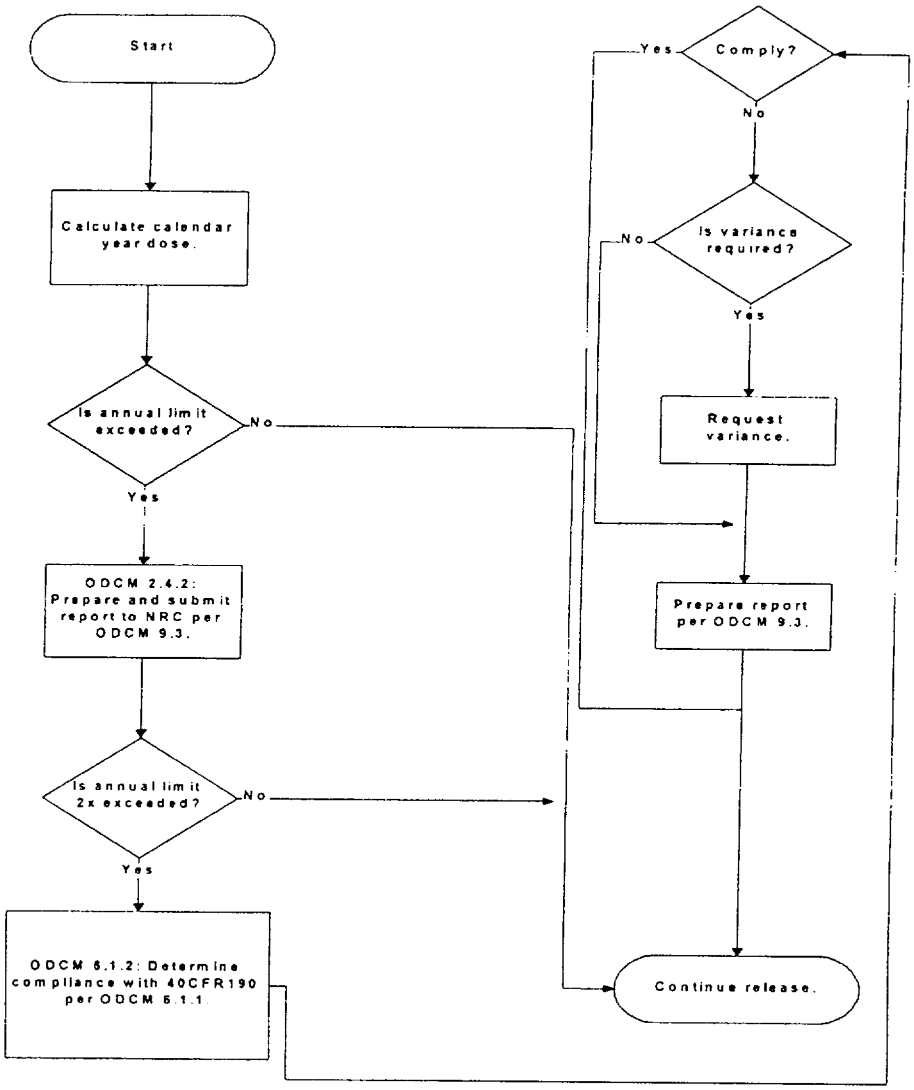


7.2 Compliance With 10CFR50 - Radioactive Material in Liquid Effluents (ODCM Specification 2.4)

7.2.1 Quarterly 10CFR50 Limits



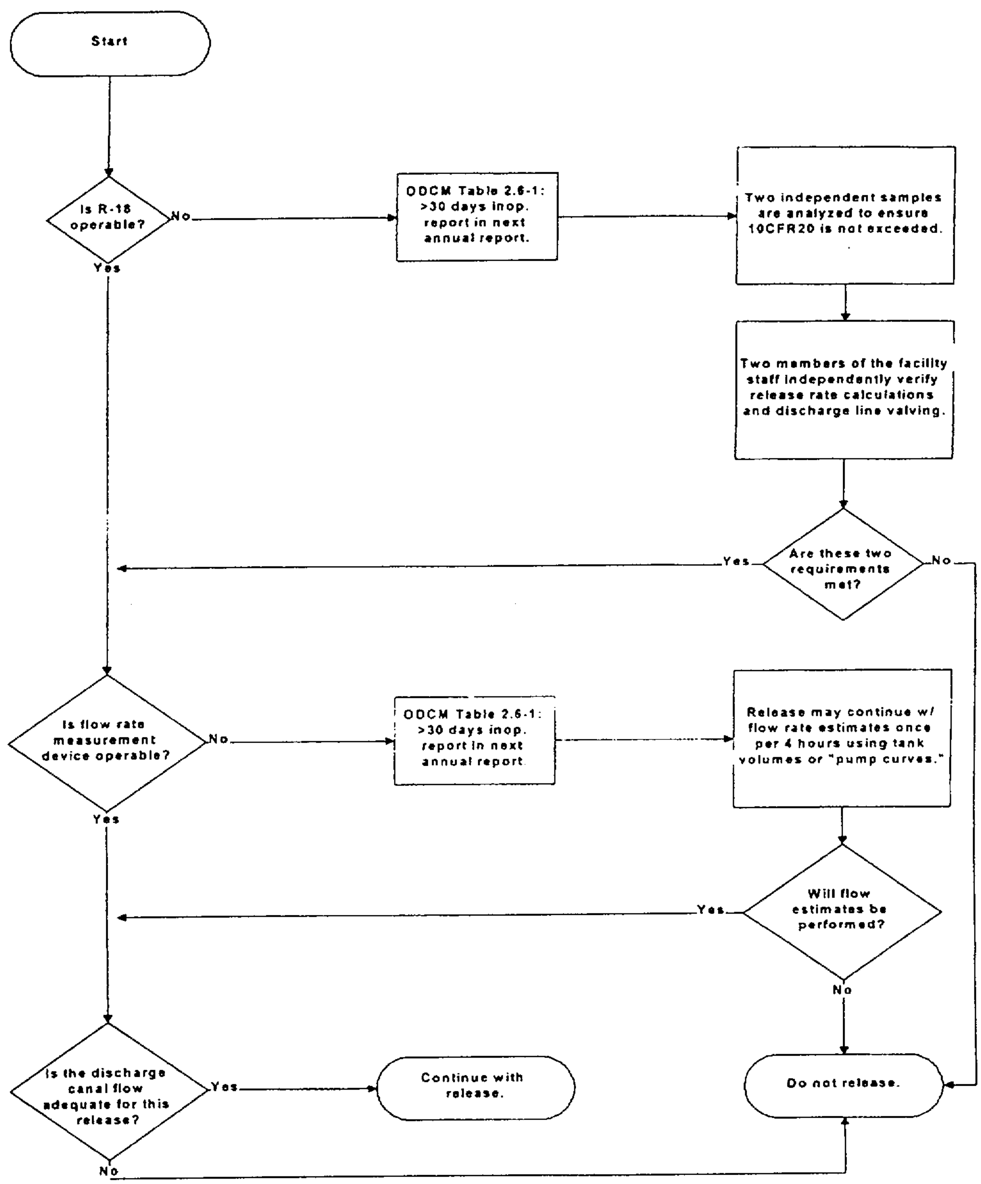
7.2.2 Annual 10CFR50 Limits



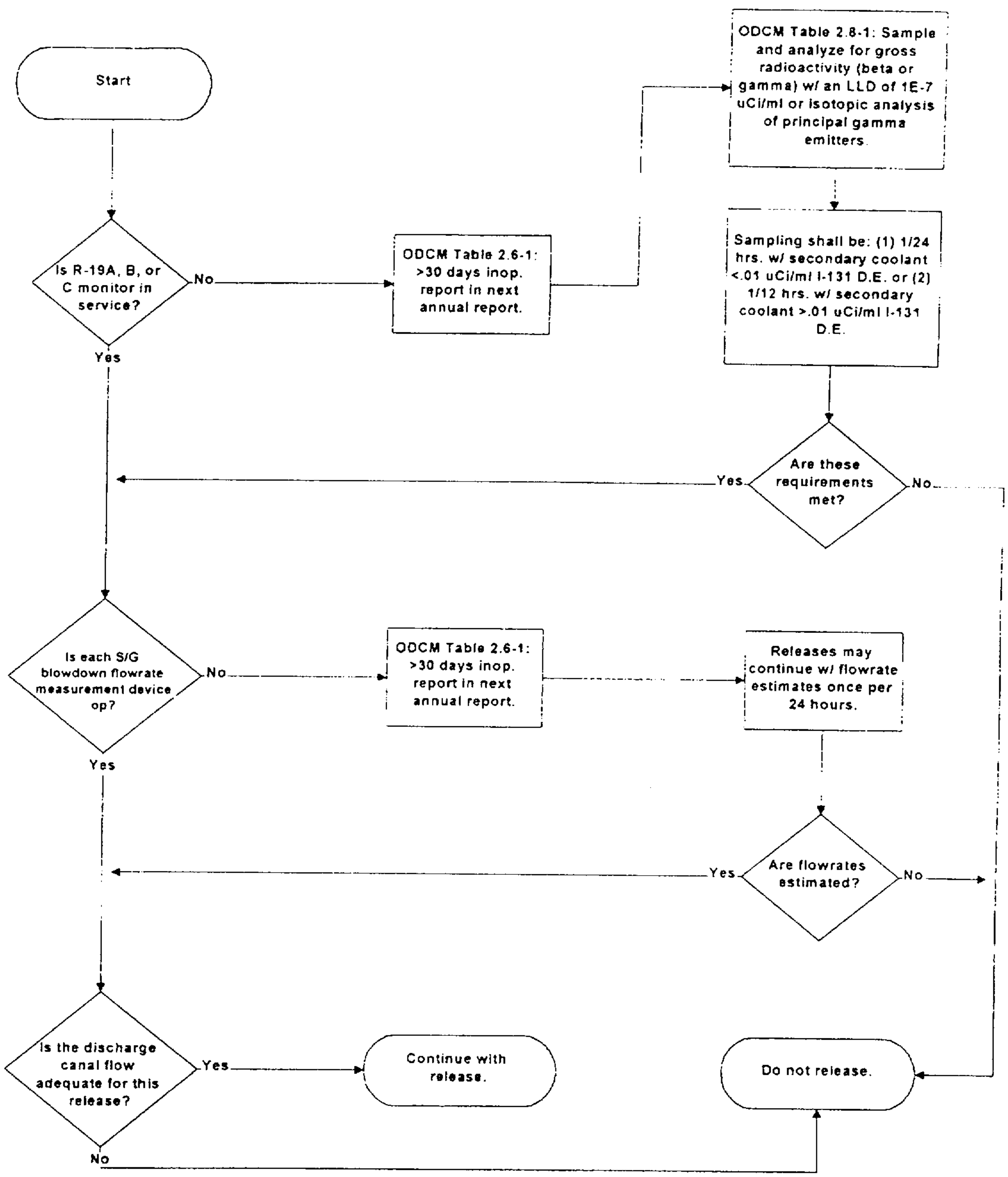
ODCM 2.4.1: Dose commitment to a member of the general public due to liquid releases to an unrestricted area shall be limited to <3.0 mrem to the total body and <10 mrem to any organ during any calendar year.

7.3 Radioactive Liquid Effluent Instrumentation Requirements (ODCM Specification 2.6)

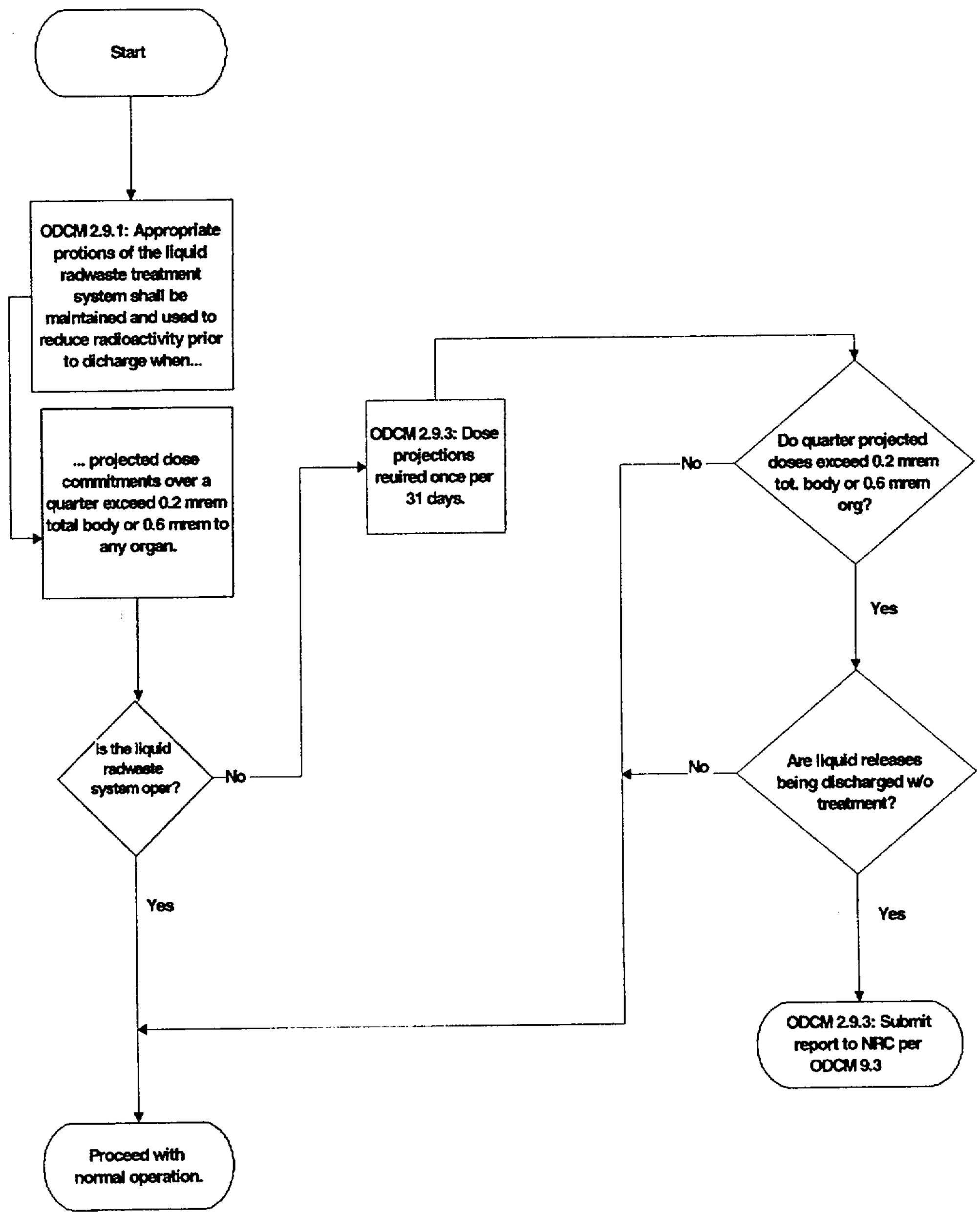
7.3.1 Batch Release Instrumentation Requirements



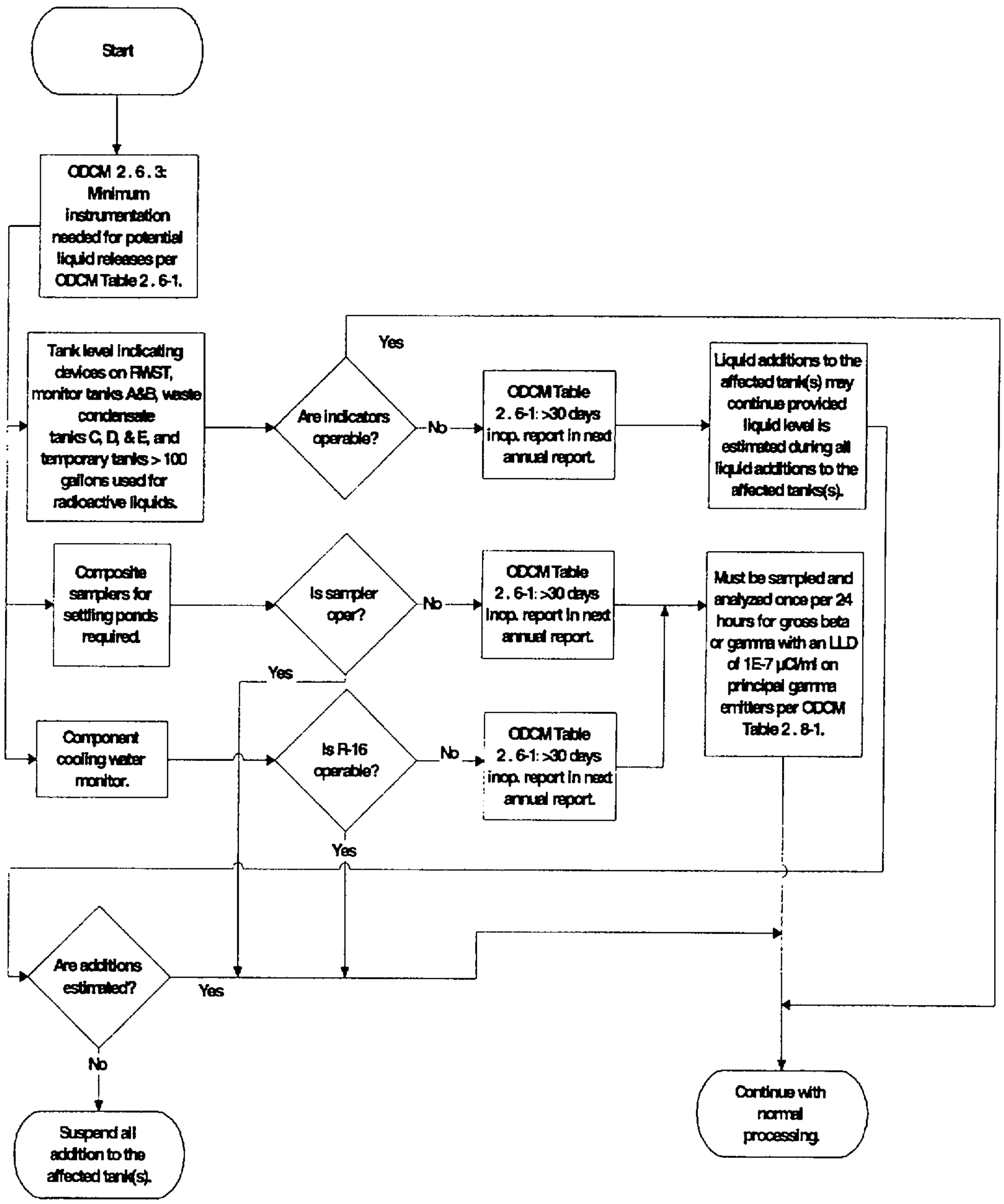
7.3.2 Continuous Release Instrumentation Requirements



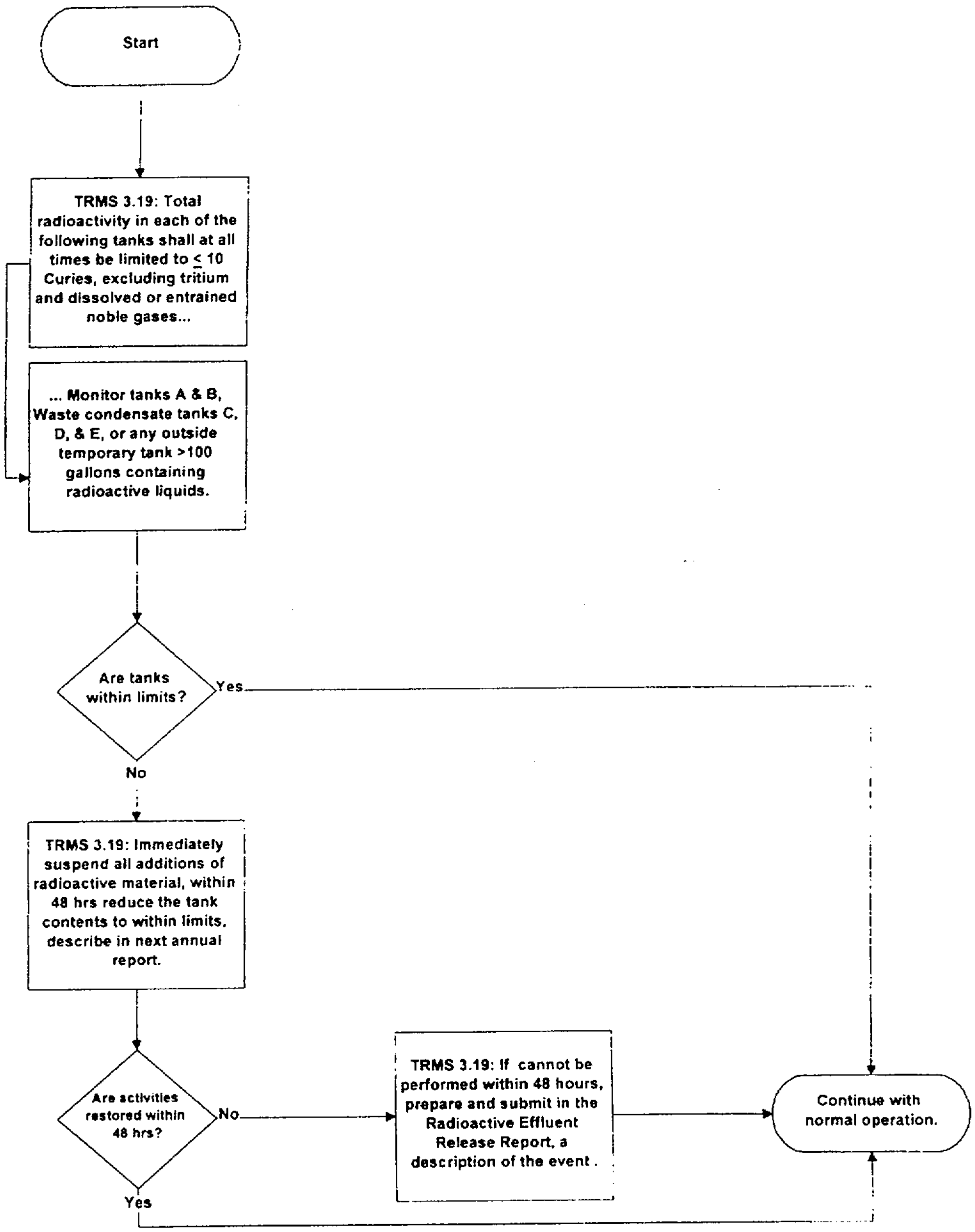
7.4 Compliance With ODCM Specification 2.9 (Liquid Radwaste Treatment System)



7.5 Process Instrumentation Requirements for Potential Releases (ODCM Specification 2.6)



7.6 Compliance With Technical Requirements Manual Specification 3.19 (Tank Limits)



7.7 Acceptance Criteria for Replicate Sampling

7.7.1 Acceptability of results of the Replicate Sample Requirements will be as follows unless **OTHERWISE** determined and documented by the E&C Supervisor or the E&C Supervisor's designee.

Resolution	Ratio Acceptance Range
<4	0.4 - 2.50
≥4 - <8	0.5 - 2.00
≥8 - <16	0.6 - 1.66
≥16 - <50	0.75 - 1.33
≥50 - <200	0.80 - 1.25
≥200	0.85 - 1.18

7.7.2 There are no acceptability limits when the activity values for a nuclide on both samples are less than MDA values.

8.0 INSTRUCTIONS

8.1 Routine Liquid Releases Reports

> **NOTE:** Normally, Node RNVX01 will be used for effluent processing. **IF** Node RNVX01 is unavailable, **CONTACT** an E&C Supervisor or assigned system manager(s) for instructions on using Node RNVS03 to run EMS.

> **CAUTION**
>
> The "RETURN" key may be used **IF** a value has been added to a field, **HOWEVER** the "TAB" **MUST** be used **IF** the user doesn't change a value in any field. Using the "RETURN" key when you haven't changed a field will zero that field.
>
> Using "CTRL P" will move the cursor backward through the screen.

8.1.1 At the CAS Main Menu **SELECT** SYSTEM FUNCTIONS **AND PRESS** "RETURN".

8.1.2 **SELECT** LOG ONTO OTHER SYSTEM **AND PRESS** "RETURN".

8.1.3 At the "**ENTER** DESTINATION NODE NAME" prompt, **TYPE** RNVX01 **AND PRESS** "RETURN".

8.1.4 **LOG ON** by entering your CAS username and password.

8.1.5 At the CAS Main Menu, **SELECT** EFFLUENT PROCESSING **AND PRESS** "RETURN".

8.1.6 **SELECT** PROCESS LIQUID PERMIT **AND PRESS** "RETURN".

8.1.7 The terminal will prompt for the release point. **ENTER** the release point number from ATTACHMENT 10.1 **AND PRESS** "RETURN".

8.1.8 The terminal will prompt for the sample ID number. **IF** nuclide concentrations are to entered manually, **PRESS** "RETURN". **OTHERWISE**, from the sample analysis printout, **ENTER** the sample ID numbers for the appropriate sample **AND PRESS** "RETURN".

8.1.9 At the LIQUID PERMIT PROCESSING menu **MOVE** the cursor to the desired release function, **PRESS** the "DO" key **AND PROCEED** to the appropriate section below for release processing.

8.2 Batch Liquid Releases

> **NOTE:** A Batch Liquid Release Permit will be issued prior to each batch liquid release (ex., Waste Condensate Tanks, Monitor Tanks, Steam Generator Drainage, etc.) based on sample analysis performed as per EMP-024.

8.2.1 Defining and Opening Batch Releases

1. The DEFINE AND OPEN A NEW LIQUID PERMIT menu will be displayed. **ENTER** "Y" to open a permit or "N" to go back to the previous menu **AND PRESS** "RETURN".

2. The next display allows the user to define a liquid permit. The cursor will be at the RELEASE START field. **ENTER** the estimated Date/Time the release will start **AND PRESS** "RETURN".

3. **PRESS** "RETURN" at the RELEASE END field.

4. The cursor will move to the RELEASE FLOW RATE field. **PRESS** the "TAB" key **IF** the default flow rate is correct **OR CHANGE** the value **AND PRESS** "RETURN".

5. **PRESS** "RETURN" at the START % field.

6. At the RELEASE VOLUME field, **SELECT** the default value by pressing the "TAB" key **OR CHANGE** the values **AND PRESS** "RETURN".

CAUTION

Do **NOT** use Unit #1 Circulating Water Pumps without an official letter from Unit #1 Operations.

7. At the DILUTION FLOW RATE field, **ENTER** the appropriate value from ATTACHMENT 10.1 using the pump data supplied by Operations on the Batch Liquid Sample Request **AND PRESS** "RETURN".

8. **PRESS** "RETURN" at the DILUTION VOLUME field.

9. The cursor moves to the DATE/TIME RECIRC. STARTED field. **ENTER** the date/time the recirculation of the release tank was started from the Batch Liquid Sample Request **AND PRESS** "RETURN".

10. **PRESS** "RETURN" at the COLLECTION DATE/TIME field.

11. **ENTER** the initials of the person running the release in the COLLECTED BY field **AND PRESS** "RETURN".

12. The cursor will move to the UNPLANNED field. **PRESS** "RETURN".

13. **REVIEW** all entries carefully **AND PRESS** the (FILL) "F14" key to calculate all other data fields.

14. After reviewing all data on the screen **PRESS** the (SAVE) "F10" key to save the data.

15. **IF** "RELEASE START date is before today "Proceed?" is displayed, **PRESS** "RETURN".

16. **PRESS** the (PROCESS) "DO" key. The NUCLIDE CONCENTRATION table (nuclides in composite table) will be displayed.

17. For manual nuclide entry, **PROCEED** to Section 8.4; **OTHERWISE, PRESS** the (VMS_GSP) "F12" key to import the gamma spectral data, **IF** a sample ID number was entered in Step 8.1.8.

18. **COMPARE** the data displayed with the data shown on the gamma scan. **EDIT** the data per Section 8.4, **IF** necessary. **IF** no editing is necessary, **PRESS** the (SAVE) "F10" key **AND THEN PRESS** the (PROCESS) "DO" key.

19. **IF** no detectable activity was entered into the concentrations table, the terminal will respond "No concentrations found for sample xx (Return). **PRESS** "RETURN". The terminal will then respond "CONTINUE? (Y/N)". **ENTER** "Y" **AND PRESS** "RETURN".

NOTE: The Monitor Background is obtained from the Batch Liquid Sample Request for R-18 and from the most recent Radiation Monitor Background Status for R-19 A, B, and C.

20. The MONITOR BACKGROUND screen will be displayed. **ENTER** the background **AND PRESS** "RETURN" **AND THEN PRESS** the (PROCESS) "DO" key.

21. The LIQUID EFFLUENT PERMIT screen will be displayed next (The status will be "DEFINED"). **ENSURE** that the LIMITS EXCEEDED field indicates "NONE". **IF** limits have been exceeded, **CONSULT** with the E&C Supervisor or the E&C Supervisor's designee.

22. The cursor is now located on the command line. **PRESS** the (PROCESS) "DO" key. The question will appear "PERMIT WILL BE OPENED, ARE YOU SURE? Y/N". **TYPE** "Y" for release completion **AND PRESS** "RETURN" (The status will change to "OPEN").

23. The cursor will again **MOVE** to the command line. **PRESS** the (REPORT) "F20" key. **PRESS** "RETURN" twice to generate the desired copies of the release (The 2 returns answer the default prompts for the number of copies of the special report and the standard report, respectively.).

24. **PRESS** (QUIT) "PF4". The display will ask "ARE YOU SURE YOU WANT TO QUIT? YES (Return) or NO (N)". **PRESS** "RETURN".

25. At the CAS EFFLUENT PROCESSING menu, **PRESS** "PF4" to exit back to the CAS Main Menu.

26. **PROCEED** to Section 8.5 to initiate a Liquid Waste Release permit.

8.2.2 Closing Batch Releases

1. The CLOSE A LIQUID PERMIT screen will be displayed. **ENTER** the release point number **AND PRESS** "RETURN".

2. The data from the open permit from this release point will be displayed. Make certain this is the permit to be closed.

3. **PRESS** the (PROCESS) "DO" key and the cursor will move to the RELEASE START field. **ENTER** the actual date/time the release began **AND PRESS** "RETURN".

4. At the RELEASE END field, **ENTER** the actual date/time the release ended **AND PRESS** "RETURN".

5. **PRESS** "RETURN" at the RELEASE FLOW RATE field.

6. **PRESS** "RETURN" at the START % field.

7. The cursor will move to the RELEASE VOLUME field. **ENTER** the actual volume **AND PRESS** "RETURN".

8. At the DILUTION FLOW RATE field, **ENTER** the actual circulating water flow rate (See ATTACHMENT 10.1) based on the actual number circulating pumps in service during the release **AND PRESS** "RETURN".

9. **PRESS** "RETURN" at the DILUTION VOLUME field.

10. **PRESS** the (FILL) "F14" key. **IF** all data is correct, **PRESS** the (SAVE) "F10" key.

11. **IF** "RELEASE START date is before today, Proceed?" is displayed, **PRESS** "RETURN".

12. **PRESS** the (PROCESS) "DO" key and the CONCENTRATIONS table will appear.

13. **EDIT** the CONCENTRATIONS table, **IF** necessary, per Section 8.4. **IF** no editing is needed, **PRESS** the (PROCESS) "DO" key.

14. **IF** no detectable activity was entered into the concentrations table, the terminal will respond "No concentrations found for sample xx (Return). **PRESS** "RETURN". The terminal will then respond "CONTINUE? (Y/N)". **ENTER** "Y" **AND PRESS** "RETURN".

15. The LIQUID EFFLUENT PERMIT screen will be displayed. **ENSURE** that the LIMITS EXCEEDED field shows "NONE". **IF** any limits have been exceeded, **CONSULT** with the E&C Supervisor or the E&C Supervisor's designee.

16. The cursor will be at the command line. **PRESS** the (PROCESS) "DO" key. The terminal will respond "PERMIT WILL BE CLOSED" then "ARE YOU SURE? Y/N". **ENTER** "Y" **AND PRESS** "RETURN" to close the permit. The terminal should temporarily display "CUMULATIVE TABLES UPDATED SUCCESSFULLY" and the status should change to "CLOSED".

17. With the cursor on the command line, **PRESS** the (REPORT) "F20" key. **PRESS** "RETURN" at the prompt for COPIES OF STANDARD REPORTS [X] (Where [X] is the default number of copies).

18. **PRESS** (QUIT) "PF4" to exit. The display will ask "ARE YOU SURE YOU WANT TO QUIT? Yes (Return) or No(N)." **PRESS** "RETURN".

19. The CAS effluent processing menu will be displayed. **PRESS** "PF4" to exit back to the CAS Main Menu.

20. **PROCEED** to Section 8.6 for Post-Release permit review and approval.

8.3 Continuous Liquid Releases

NOTE: A Continuous Liquid Release Permit will normally be generated weekly, for accountability purposes, for all continuous release points (ex., S/G Blowdown and Condensate Polisher Waste Water Discharge). These permits may need to be issued more frequently **IF** source terms change during the week (ex., High Level Alarm, additional sampling required as per EMP-024, etc.).

8.3.1 Defining and Opening Continuous Releases

1. The DEFINE AND OPEN A NEW LIQUID PERMIT menu will be displayed. **ENTER** "Y" to open a permit or "N" to go back to the previous menu **AND PRESS** "RETURN".

NOTE: The software does **NOT** allow overlapping time periods for the same release point; therefore, **IF** entering a START date/time that is the same as the END date/time of the previous permit for the same release point, it may be necessary to add 1 second to the START date/time.

2. The next display allows the user to define a liquid permit. The cursor will be at the RELEASE START field. **ENTER** the date/time for the beginning of the release period **AND PRESS** "RETURN".

3. At the RELEASE END field, **ENTER** the estimated date/time the release should end (usually 7 days after RELEASE START) **AND PRESS** "RETURN".

4. At the RELEASE FLOW RATE field **SELECT** the default value by pressing "TAB" **OR CHANGE** the value (See ATTACHMENT 10.1), **IF** incorrect, **AND PRESS** "RETURN".

5. **PRESS** "RETURN" at the START % field.

6. **PRESS** "RETURN" at the RELEASE VOLUME field.

CAUTION

Do **NOT** use Unit #1 Circulating Water Pumps without an official letter from Unit #1 Operations.

7. At the DILUTION FLOW RATE field **SELECT** the default value by pressing "TAB" **or CHANGE** the value (See ATTACHMENT 10.1), **IF** incorrect, **AND PRESS** "RETURN".

8. **PRESS** "RETURN" at the DILUTION VOLUME field.

9. **PRESS** "RETURN" at the DATE/TIME RECIRC. STARTED and the COLLECTION DATE/TIME fields.

10. **ENTER** the initials of the person running the release in the COLLECTED BY field **AND PRESS** "RETURN".

11. **PRESS** "RETURN" at the UNPLANNED field.

12. **REVIEW** all entries carefully **AND PRESS** the (FILL) "F14" key to calculate all other data fields.

13. After reviewing all data on the screen, **PRESS** the (SAVE) "F10" key to save the data.

14. **IF** "RELEASE START date is before today. Proceed?" is displayed, **PRESS** "RETURN".

15. **PRESS** the (PROCESS) "DO" key.

16. Next the CONCENTRATIONS table will appear. For manual nuclide entry, **PROCEED** to Step 8.4; **OTHERWISE**, **PRESS** the (VMS_GSP) "F12" key to import the gamma spectral data, **IF** a sample ID number was entered in Step 8.1.8.

17. **COMPARE** the data displayed with the data shown on the gamma scan. **EDIT** the data per Section 8.4, **IF** necessary. **IF** no editing is necessary, **PRESS** the (PROCESS) "DO" key.

18. **IF** no detectable activity was entered into the concentrations table, the terminal will respond "No concentrations found for sample xx (Return). **PRESS** "RETURN". The terminal will then respond "CONTINUE? (Y/N)". **ENTER** "Y" **AND PRESS** "RETURN".

19. The MONITOR BACKGROUND screen will be displayed. **ENTER** the background from the most recent ATTACHMENT 10.5 **AND PRESS** "RETURN" **AND THEN PRESS** the (PROCESS) "DO" key.

20. The LIQUID EFFLUENT PERMIT SCREEN will be displayed next (The status will be "DEFINED"). **ENSURE** that the LIMITS EXCEEDED field shows "NONE". **IF** limits have been exceeded **CONSULT** with the E&C Supervisor **OR** the E&C Supervisor's designee.

21. The cursor is now located on the command line. **PRESS** the (PROCESS) "DO" key. The question will appear "PERMIT WILL BE OPENED, ARE YOU SURE? Y/N". **TYPE** "Y" for release completion **AND PRESS** "RETURN" (The status will change to "OPEN").

22. The cursor will again move to command line. **PRESS** the (REPORT) "F20" key. **PRESS** "RETURN" twice to generate the desired copies of the release (The 2 returns answer the default prompts for the number of copies of the special report and the standard report, respectively).

23. **PRESS** (QUIT) "PF4". The display will ask "ARE YOU SURE YOU WANT TO QUIT? Yes (Return) or No (N)." **PRESS** "RETURN".

24. At the CAS EFFLUENT PROCESSING menu, **PRESS** "PF4" to exit back to the CAS Main Menu **AND PROCEED** to Section 8.5 to initiate a Liquid Waste Release Permit.

8.3.2 Closing Continuous Releases

1. The CLOSE A LIQUID PERMIT screen will be displayed. **ENTER** the release point number **AND PRESS** "RETURN".

2. The data from the open permit from this release point will be displayed. Make certain this is the permit to be closed.

3. **PRESS** the (PROCESS) "DO" key.

4. At the RELEASE START field, **ENTER** the date and time the release began **AND PRESS** "RETURN".

5. At the RELEASE END field, **ENTER** the date and time the release ended **AND PRESS** "RETURN".

6. At the RELEASE FLOW RATE field, **PRESS** "RETURN".

7. **PRESS** "RETURN" at the START % field.

8. At the RELEASE VOLUME field, **ENTER** the actual calculated release gallons **AND PRESS** "RETURN".

9. At the DILUTION FLOW RATE field, **ENTER** the actual circulating water flow rate (See ATTACHMENT 10.1) based on the actual number circulating pumps in service during the release **AND PRESS** "RETURN".

10. **PRESS** "RETURN" at the DILUTION VOLUME field.

11. **REVIEW** all entries carefully **AND PRESS** the (FILL) "F14" key to calculate all other data fields.

12. **PRESS** the (SAVE) "F10" key.

13. **IF** "RELEASE START date is before today, Proceed ?" is displayed, **PRESS** "RETURN".

14. **PRESS** the (PROCESS) "DO" key and the CONCENTRATIONS table will appear. **EDIT** the table, **IF** necessary, per Section 8.4 **AND THEN PRESS** the (PROCESS) "DO" key.

15. **IF** no detectable activity was entered into the concentrations table, the terminal will respond "No concentrations found for sample xx (Return). **PRESS** "RETURN". The terminal will then respond "CONTINUE? (Y/N)". **ENTER** "Y" **AND PRESS** "RETURN".

16. The LIQUID EFFLUENT PERMIT screen will be displayed. **ENSURE** that the LIMITS EXCEEDED field shows "NONE". **IF** any limits have been exceeded **CONSULT** with the E&C Supervisor or the E&C Supervisor's designee.

17. The cursor will be at the command line. **PRESS** the (PROCESS) "DO" key. The terminal will respond "PERMIT WILL BE CLOSED" **then** "ARE YOU SURE? Y/N". **ENTER** "Y" **AND PRESS** "RETURN" to close the permit. The terminal should temporarily display "TABLES UPDATED SUCCESSFULLY" and the status should change to "CLOSED".

18. With the cursor on the command line, **PRESS** the (REPORT) "F20" key. Then **PRESS** "RETURN" at prompt for COPIES OF STANDARD REPORTS [X] (Where [X] is the default number of copies).

19. **PRESS** (QUIT) "PF4" to exit.The display will ask "ARE YOU SURE YOU WANT TO QUIT? Yes (Return) or No (N)." **PRESS** "RETURN".

20. The CAS effluent processing menu will be displayed. **PRESS** "PF4" to exit back to the CAS Main Menu.

21. **PROCEED** to Section 8.6 for Post-Release permit review and approval.

8.4 Editing the NUCLIDE CONCENTRATION Table

8.4.1 **CONSULT** the responsible E&C Supervisor, the E&C Supervisor's designee, or an assigned system manager to obtain the password to make any changes.

> **NOTE:** To edit concentrations, **PERFORM** Steps 8.4.2 through 8.4.6, for nuclide removal, **PERFORM** Steps 8.4.7 through 8.4.11, and to add a nuclide, **PERFORM** Steps 8.4.12 through 8.4.16.

8.4.2 To change the concentration of a nuclide, **MOVE** the cursor by pressing the "TAB" key to the CONCENTRATION COLUMN.

8.4.3 Using the arrow "Keys" (up and down), **SELECT** the nuclide(s) for editing, **ENTER** the correct value(s), **AND PRESS** "RETURN".

8.4.4 **IF** there is no additional editing needed, **PRESS** the (SAVE) "F10" key.

8.4.5 The display will prompt with "Has this been authorized?" **ENTER** "Y" for yes **AND PRESS** "RETURN".

8.4.6 The system will ask for the password. **ENTER** in the password **AND PRESS** "RETURN" **AND RETURN** to the applicable step.

8.4.7 To remove a nuclide(s), make sure the cursor is on the nuclide to be removed **AND PRESS** the "REMOVE" key.

8.4.8 The display will read "by Sample or Row". **ENTER** "R" for row (nuclide and concentration removal) or "S" for sample (all nuclides and concentration removal in the sample) **AND PRESS** "RETURN".

8.4.9 When all necessary deletions are completed, **PRESS** the (SAVE) "F10" key.

8.4.10 The display will prompt with "Has this been authorized?" **ENTER** "Y" for yes **AND PRESS** "RETURN".

8.4.11 The system will ask for the password. **ENTER** in the password **AND PRESS** "RETURN" **AND RETURN** to the applicable step.

8.4.12 To include an additional nuclide, **ENTER** the nuclide in the Nuclide column **AND PRESS** the "TAB" key.

8.4.13 **TYPE** in the concentration **AND PRESS** "RETURN".

8.4.14 **IF** there are no additional nuclides to be added, **PRESS** the (SAVE) "F10" key.

8.4.15 The display will prompt with "Has this been authorized?" **ENTER** "Y" for yes **AND PRESS** "RETURN".

8.4.16 The system will ask for the password. **ENTER** in the password **AND PRESS** "RETURN" **AND RETURN** to the applicable step.

8.5 Completing a Liquid Waste Release Permit

8.5.1 **OBTAIN** the "Gamma Spectroscopy Analysis" report and the "Pre-Release Permit" from the printer. **CIRCLE** the particular tank (for batch releases) on the "Pre-Release Permit."

8.5.2 **OBTAIN** a Liquid Waste Release Permit (ATTACHMENT 10.3 or ATTACHMENT 10.4) **AND ADD** the following data to the top of the form:

1. Release number - as listed on Page 1 of the Pre-Release Permit (example: #960001-L).
2. Sample Submission Number (SSN).
3. Date.

8.5.3 **For Continuous Releases** (ATTACHMENT 10.4), **ENTER** the following information, as appropriate, in Part I, Release Information:

1. **WRITE** in the appropriate Release Point (see ATTACHMENT 10.1).
2. **ENTER** the release Start date and time and integrator reading, **IF** applicable.

8.5.4 **For Batch Releases** (ATTACHMENT 10.3), **ENTER** the following information as appropriate in Part I, Release Information:

1. **CIRCLE** the appropriate Waste Condensate Tank, Monitor Tank, or Steam Generator, or **WRITE** in another appropriate release pathway in the "Other" blank.

2. **ENTER** the estimated release start/stop dates and times as referenced on Page 1, Part I: Pre-Release Information, of the generated Pre-Release Permit.

CAUTION
Do **NOT** use Unit #1 Circulating Water Pumps without an official letter from Unit #1 Operations.

3. Dilution Flow Data - **CIRCLE** which unit circulating water pumps are to be used for dilution and the number of these pumps used for this release rate calculation. **ENTER** the dilution rate for this configuration as listed on ATTACHMENT 10.1.

4. Release Rate Data - **ENTER** the Maximum Release Rate for the dilution rate above. This value may be obtained from Part II, Pre-Release Calculations under the heading MAX WASTE (GPM) of the generated Pre-Release Permit. **IF** this value exceeds MAX design flow rate of this discharge pathway (see ATTACHMENT 10.1), **ENTER** only the MAX design flow rate. **OTHERWISE**, **RECORD** the value obtained from the Pre-Release Permit.

CAUTION
For batch releases via R-18 or R-19A/B/C, the maximum valid setpoint is 1.0E+06 cpm.

5. Monitor Data - **ENTER** the radiation monitor name and setpoint from the Pre-Release Permit, MAX SETPOINT CPM corresponding to the appropriate dilution flowrate.

6. **OBTAIN** the dose projection (31 day) from the generated Pre-Release Permit **AND ENTER** the following Dose Assessment information in Part I, Pre-Release Information:

   a. Total-Body percent of this limit - **ENTER** this value which may be obtained from the generated Pre-Release Permit, Cumulative Dose For Unit 2 (mrem), under the header TOT-BODY by the label % 31 DAY LIMIT.

   b. Organ percent of this limit - **ENTER** the organ having the highest 31 day dose contribution, and percent of 31 day limit for this organ. This may be obtained from the generated Pre-Release Permit, Cumulative Dose For Unit 2 (mrem), under the header for the organ (example: Liver) by the label 31D AFTER RELEASE and % 31 DAY LIMIT.

7. **OBTAIN** the 10CFR50 Quarterly Dose Totals **AND ENTER** the following Dose Assessment information in Part I, Pre-Release Information:

   a. Total Body percent of this limit - **ENTER** this value which may be obtained from the generated Pre-Release Permit, Cumulative Dose For Unit 2 (mrem), under the header TOT-BODY by the label % QUARTER LIMIT.

   b. Organ percent of this limit - **ENTER** the organ having the highest quarterly dose contribution, and percent of quarter limit for this organ. This may be obtained from the generated Pre-Release Permit, Cumulative Dose For Unit 2 (mrem), under the header for the organ (example: Liver) by the label QTR AFTER RELEASE and % QUARTER LIMIT.

8. **OBTAIN** the 10CFR50 Annual Dose Totals **AND ENTER** the following Dose Assessment information in Part I, Pre-Release Information:

   a. Total-Body and percent of this limit - **ENTER** this value which may be obtained from the generated Pre-Release Permit, Cumulative Dose For Unit 2 (mrem), under the header TOT-BODY by the label % ANNUAL LIMIT.

   b. Organ percent of this limit - **ENTER** the organ having the highest annual dose contribution, and percent of annual limit for this organ. This may be obtained from the generated Pre-Release Permit, Cumulative Dose For Unit 2 (mrem), under the header for the organ (example: LIVER) by the label ANN AFTER RELEASE and % ANNUAL LIMIT.

9. For Radwaste Treatment System Operability, **INITIAL** in the appropriate blank to document whether the Radwaste Treatment System is operable or inoperable (CR 99-01075)

10. **RECORD** the pH of the tank sampled in the appropriate blank.

8.5.5 **REVIEW** the LIQUID WASTE RELEASE PERMIT **AND ENSURE** the release can be made within applicable limits as listed on the form (**REFER** to Section 3.1 of this procedure.) **SIGN** the "Prepared By" blank on the Liquid Waste Release Permit.

8.5.6 **IF** the release requires E&C Supervisor Approval, per Section 3.1, the E&C Supervisor or the E&C Supervisor's designee signs the Liquid Waste Release Permit under "Release Approval". **IF** E&C Supervisor's signature is **NOT** required, **N/A** this blank.

8.5.7 **RETAIN** a copy of the Gamma Spectroscopy Analysis Report and the Pre-Release Permit in the fireproof file cabinet in the Radiochemistry Analytical Lab.

8.5.8 **IF** release is a batch release, **ROUTE** the Liquid Waste Release Permit (ATTACHMENT 10.3) to the Shift Superintendent. The Shift Superintendent then reviews the permit and signs by "Approved for Release". Operations then performs the release as per appropriate Operations procedures and completes "Part II, Radiation Monitor Information" and "Part III, Release Information". Upon completion of the release, Operations routes the Liquid Waste Release Permit to the E&C subunit for posting purposes.

8.5.9 **IF** release is a continuous release, **DELIVER** ATTACHMENT 10.8 to the Shift Superintendent for review and approval. E&C then completes "Part I, Release Information" and "Part II, Radiation Monitor Information" of the Liquid Waste Release Permit, as required. Release Permits may remain in the E&C counting room for the duration of the release.

8.6 Post-Release Permit Review and Approval

8.6.1 **REVIEW** the Post-Release Permit for the following:

1. All input parameters were entered correctly (example: start/stop date and time, total waste volume released,..., etc.) These inputs are found in the Post-Release Permit. **CIRCLE** the particular tank (for batch releases) on the Post-Release Permit.

2. Compliance with 10CFR20 - **ENSURE** the post-dilution concentration/EC was below a fraction of 1.0. This may be found in the Post-Release Permit. **IF** this limit is exceeded, make prompt notification to E&C Supervisor **AND ENSURE** compliance with Technical Specification 6.6.

3. Compliance with 10CFR50 - Percent Quarterly limit and Annual limit (for Total Body and all other organs) are below 100%. This may be obtained by the label % QUARTERLY LIMIT and % ANNUAL LIMIT. **IF** either of these limits are exceeded, **REFER** to Sections 7.2.1 and 7.2.2 of this procedure **AND MAKE** prompt notification to E&C Supervisor.

8.6.2 **SIGN AND DATE** "Release Posted By."

8.6.3 **PREPARE** composite sample (as per EMP-019) **OR SAVE** the sample to be composited later, **IF** required.

8.6.4 **ROUTE** a copy of the Gamma Spectroscopy Analysis report, a copy of the Pre-Release Permit, a copy of the Post-Release Permit, and the Liquid Waste Release Permit (ATTACHMENT 10.3 or 10.4) to the E&C staff member for review. The reviewer ensures the release was completed in accordance to the Post Liquid Release Review Checklist, ATTACHMENT 10.7, and then **SIGNS AND DATES** in the "Reviewed By" space under "Post Release Review."

8.6.5 **ROUTE** a copy of the Pre-Release Permit, a copy of the Post-Release Permit, and the Liquid Waste Release Permit (ATTACHMENT 10.3 or 10.4) to the E&C Supervisor or the E&C Supervisor's designee for approval. The E&C Supervisor or the E&C Supervisor's designee ensures that all documents are completed properly.

8.6.6 The E&C Supervisor or the E&C Supervisor's designee **SIGNS AND DATES** under "Post-Release Review" on the Liquid Release Permit.

8.7 Liquid Effluent Sampling

8.7.1 Steam Generator Blowdown Sampling

1. Steam generator blowdown samples **SHALL** be collected in accordance with chemistry sampling procedures with a minimum frequency as detailed in EMP-024. **ENSURE** that an adequate amount of sample is collected for composite purposes per EMP-019.

2. For the gamma isotopic analysis, **PREPARE** a 1,000 milliliter sample or other appropriate volume from the weekly steam generator composite container (for weekly accountability) or from grab sample (**IF** accountability period less than weekly). Analysis frequencies may be more frequent than minimum frequency listed on EMP-024, in the event of primary to secondary leakage. A tritium sample should be prepared and analyzed in this situation, in accordance with appropriate Radiochemistry Procedure.

3. **LABEL AND SUBMIT** the sample(s) to the Radiochemistry Analytical Lab (in accordance with appropriate Radiochemistry Procedure) for analysis leaving instructions for return of the sample.

4. **GENERATE** a Pre-Release Permit, **IF** required, as per Section 8.1.

8.7.2 Steam Generator Drainage Sampling

1. Prior to sampling a Steam Generator for release, Operations personnel **MUST SUBMIT** a "Batch Liquid Sample Request" form (ATTACHMENT 10.2) to the E&C unit.

2. Minimum sample collection and analysis **SHALL** be as per EMP-024.

3. **RINSE** the sample containers thoroughly before obtaining the sample to prevent the possible transfer of contamination from previous samples.

4. **COLLECT** at least 1,000 milliliters from the discharge of the steam generator wet layup recirculation pump to be drained in accordance with appropriate Chemistry Sampling Procedure(s) or from another sampling point, provided with Operations assistance. **ENSURE** that an adequate amount of sample is collected for composite purposes per EMP-019.

5. **PREPARE** a 1,000 milliliter sample or other appropriate volume for gamma isotopic analysis.

6. **PREPARE** a sample for tritium analysis in accordance with the appropriate Radiochemistry procedure.

7. **LABEL AND SUBMIT** the sample(s) to the Radiochemistry Analytical Lab (in accordance with the appropriate Radiochemistry Procedure) for analysis leaving instructions for return of the sample. **REFER** to EMP-019, Section 8.4, for tritium update and for additional required composite samples and analysis.

8. **GENERATE** a Pre-Release Permit, **IF** required, as per Section 8.1.

8.7.3 Monitor Tanks (A and B) Sampling

1. Prior to sampling these tanks for release, Operations personnel **MUST SUBMIT** a "Batch Liquid Sample Request" form (ATTACHMENT 10.2) to the E&C unit.

> **NOTE:** After at least one hour of recirculation on the tank, a sample may be obtained in accordance with EMP-024.
>
> The sampling point for these tanks is located between monitor tank recirculation pumps (A&B).

2. To sample Monitor Tank A, **OPEN** valve **CVC-1297D.** To sample Monitor Tank B, **OPEN** valve **CVC-1297C.** (CR 96-01043)

3. **RINSE** the sample container thoroughly before sampling to prevent any possible transfer of contamination from previous sampling.

4. **PURGE** the sample line for approximately two minutes **AND THEN COLLECT** at least 1,000 milliliters of sample. **ENSURE** that an adequate amount of sample is collected for composite purposes per EMP-019.

5. Upon completion of sampling, **CLOSE** the appropriate sample valve: **CVC-1297D** for Monitor Tank A or **CVC-1297C** for Monitor Tank B. (CR 96-01043)

6. **NOTIFY** Operations personnel that sampling is complete so that the recirculation pump may be stopped.

7. **COMPLETE** Part II of the "Batch Liquid Sample Request" form (ATTACHMENT 10.2).

8. **TRANSFER** 1,000 milliliters of the sample or other appropriate volume to an appropriate counting geometry as soon as possible after collection for gamma isotopic analysis.

9. **PREPARE** a sample for tritium analysis, **UNLESS OTHERWISE** directed by the E&C Supervisor or the E&C Supervisor's designee, in accordance with the appropriate Radiochemistry Procedure. (CR-01699)

10. **LABEL AND SUBMIT** the sample(s) to the Radiochemistry Analytical Lab (as per appropriate Radiochemistry Procedure) for analysis leaving instructions for return of the sample. **REFER** to EMP-019 for required composite samples and analysis.

11. **GENERATE** a Pre-Release Permit, **IF** required, as per Section 8.1.

8.7.4 Waste Condensate Tank (A and B) Sampling

1. Prior to sampling these tanks for release, Operations personnel **MUST SUBMIT** a "Batch Liquid Sample Request" form (ATTACHMENT 10.2) to the E&C unit.

> **NOTE:** After at least one hour of recirculation on the tank, a sample may be obtained in accordance with EMP-024.
>
> The sample point for these tanks is located between Waste Condensate Tanks (A & B).

2. To sample WCT A, **OPEN** valve **WD-1837**. To sample WCT B, **OPEN** valve **WD-1838.** (CR 96-01044)

3. **RINSE** the container thoroughly before sampling to prevent any possible transfer of contamination from previous samples.

4. **PURGE** the sample line for approximately two minutes **AND THEN COLLECT** at least 1,000 milliliters of sample. **ENSURE** that an adequate amount of sample is collected for composite purposes per EMP-019.

5. Upon completion of the sampling, **CLOSE** the appropriate sample valve: **WD-1837** for WCT A or **WD-1838** for WCT B. (CR 96-01044)

6. **NOTIFY** Operations personnel that sampling is complete so that the recirculation pump may be stopped.

7. **COMPLETE** Part II of the "Batch Liquid Sample Request" form (ATTACHMENT 10.2).

8. **TRANSFER** 1,000 milliliters of the sample or other appropriate volume to an appropriate counting geometry as soon as possible after collection for gamma isotopic analysis.

9. **PREPARE** a sample for tritium analysis, **UNLESS OTHERWISE** directed by the E&C Supervisor or the E&C Supervisor's designee, in accordance with the appropriate Radiochemistry Procedure. (CR-01699)

10. **LABEL AND SUBMIT** the sample to the Radiochemistry Analytical Lab (in accordance with appropriate Radiochemistry Procedure) for analysis leaving instruction to return the sample. **REFER** to EMP-019 for required composite samples and analysis.

11. **GENERATE** a Pre-Release Permit, **IF** required, as per Section 8.1.

8.7.5 Waste Condensate Tanks (C, D, and E) Sampling

1. Prior to sampling these tanks for release, Operations personnel **MUST SUBMIT** a "Batch Liquid Sample Request" form (ATTACHMENT 10.2) to the E&C unit.

NOTE: After at least one hour of recirculation on the tank, a sample may be obtained in accordance with EMP-024.

The sample point for these tanks is located inside the shed that houses the recirculation pumps for these tanks.

All three tanks (WCT C, D, & E) are sampled using the same sample line; therefore, it is necessary to verify with Operations that the proper tank is being recirculated.

2. To sample a tank, **OPEN WD-2196** (Waste Condensate Recirc. Pump Discharge Sample) then the sample sink valve labeled "**Recirculation Pump Distillate Sample**" (ACR 94-01704).

3. **RINSE** the sample container thoroughly before sampling to prevent any possible transfer of contamination from previous samples.

4. **PURGE** the sample line for approximately two minutes **AND THEN COLLECT** at least 1,000 milliliters of sample. **ENSURE** that an adequate amount of sample is collected for composite purposes per EMP-019.

5. **RETURN** the sample valves to the **CLOSED** position.

6. **NOTIFY** Operations personnel that sampling is complete so that the recirculation pump may be stopped.

7. **COMPLETE** Part II of the "Batch Liquid Sample Request" form (ATTACHMENT 10.2).

8. **TRANSFER** 1,000 milliliters of the sample or other appropriate volume to an appropriate counting geometry as soon as possible after collection for gamma isotopic analysis.

9. **PREPARE** a sample for tritium analysis, **UNLESS OTHERWISE** directed by the E&C Supervisor or the E&C Supervisor's designee, in accordance with the appropriate Radiochemistry Procedure. (CR-01699)

10. **LABEL AND SUBMIT** the sample to the Radiochemistry Analytical Lab (in accordance with appropriate Radiochemistry Procedure) for analysis leaving instructions to return the sample. **REFER** to EMP-019 for required composite samples and analysis.

11. **GENERATE** a Pre-Release Permit, **IF** required, as per Section 8.1.

8.7.6 Miscellaneous Systems and Temporary Tank Sampling

1. Prior to sampling for release, Operations personnel **MUST SUBMIT** (**IF** necessary) a "Batch Liquid Sample Request" form (ATTACHMENT 10.2) to the E&C unit.

NOTE: After at least one hour of recirculation on the temporary tank, a sample may be obtained in accordance with EMP-024.

Recirculation may **NOT** be necessary for miscellaneous systems such as hotwell.

2. To sample a miscellaneous system or temporary tank, **CONTACT** Operations for an appropriate sample point.

3. **RINSE** the sample container thoroughly before sampling to prevent any possible transfer of contamination from previous samples.

4. **COLLECT** at least 1,000 milliliters of sample in accordance with appropriate Chemistry Procedure(s) or other appropriate procedure(s). **ENSURE** that an adequate amount of sample is collected for composite purposes per EMP-019.

5. Upon completion of sampling, **COMPLETE** Part II of the "Batch Liquid Sample Request" form (ATTACHMENT 10.2).

6. **TRANSFER** 1,000 milliliters of the sample or other appropriate volume to an appropriate counting geometry as soon as possible after collection for gamma isotopic analysis.

7. **PREPARE** a sample for tritium analysis, **UNLESS OTHERWISE** directed by the E&C Supervisor or the E&C Supervisor's designee, in accordance with the appropriate Radiochemistry Procedure. (CR-01699)

8. **LABEL AND SUBMIT** the sample to the Radiochemistry Analytical Lab (in accordance with appropriate Radiochemistry Procedure) for analysis leaving instructions to return the sample. **REFER** to EMP-019 for required composite samples and analysis.

9. **GENERATE** a Pre-Release Permit, **IF** required, as per Section 8.1.

8.7.7 Condensate Polisher Waste Water Effluent (Turbine Sump Discharge)

NOTE: No sampling is required when the condensate polishers are **NOT** in service and no regenerant or rinse water is being released.

1. Condensate polisher regenerant and rinse water should be sampled using one of the following methods in order of preference:

Method I (Composite Sampler Method)

- **COLLECT** at least 1,000 milliliters of sample from the in-line composite sampler, noting the date and time the sample was taken. **ENSURE** that an adequate amount of sample is collected for composite purposes per EMP-019. **DISCARD** the remaining volume in the composite sampler.

- **OBTAIN** the integrator reading from the polisher discharge integrator at the time of sample collection.

- Accountability period will be the total time from previous sample collection until this sample collection. The reference sample date will be the mid-point for this accountability period. Total volume released may be obtained from weekly RETS log (see EMP-024).

Method II (Grab Sample Method)

- In the event the composite sampler becomes inoperable, grab samples may be collected from the sample inlet or outlet of the condensate polisher system radiation monitor or from the polisher sump and neutralite water tank at a frequency referenced in EMP-024.

- Release volume estimations will be made from historical data or by the Unit II Radwaste Operations Department.

2. Upon completion of obtaining a sample, **TRANSFER** 1,000 milliliters of the sample or other appropriate volume (see Section 7.0) to an appropriate counting geometry as soon as possible after sample collection for gamma isotopic analysis.

3. **LABEL AND SUBMIT** the sample(s) to the Radiochemistry Analytical Lab (in accordance with the appropriate Radiochemistry Procedure) for analysis, leaving instructions for return of the sample. **REFER** to EMP-019 for required composite samples and analysis.

4. **GENERATE** a Pre-Release Permit, **IF** required, as per Section 8.1.

8.8 Replicate Sampling Requirements

NOTE: Replicate samples, usually duplicates, should be prepared from sources that are homogeneous as possible (ex., well mixed liquids). Replicate samples may be obtained from independent samples of a liquid waste stream.

8.8.1 **OBTAIN** the required independent samples listed below at a minimum frequency of once per 18 months, scheduled by STSS. Additonal Sample points and/or analyses may be chosen at the discretion of the E&C Supervisor or the E&C supervisor's designee.)

- Waste Condensate Tank Effluent (grab sample)
- Monitor Tank Effluent (grab sample)
- S/G Blowdown (A, B, or C S/G) Effluent (grab sample)

8.8.2 **ANALYZE** the samples as per appropriate Radiochemistry Analytical procedure.

8.8.3 Gamma Isotopic Replicates (Preferred Method)

1. From the CAS "Main Menu", **SELECT** "Sample Analysis Reports".
2. **SELECT** "Sample Comparison Report".
3. **ENTER** the sample number from the initial sample (sample #1) as the reference sample.
4. **ENTER** the sample number from the replicate sample (sample #2) as the comparison sample.
5. **OBTAIN** the Sample Comparison Report generated by CAS **AND REVIEW** the results.
6. **IF** the results are **NOT** in agreement, per section 7.0, **NOTIFY** the E&C Supervisor or the E&C Supervisor's designee.

8.8.4 Gamma Isotopic Replicates (Manual Method)

1. **OBTAIN** the analytical results **AND DOCUMENT** on ATTACHMENT 10.6.

2. **RECORD** the 1 sigma % error from the reference sample for each radionuclide listed on ATTACHMENT 10.6. (The % error is taken from the final mean in the Nuclide Line Activity Report)

3. **IF** no radionuclides are present on the printouts, **USE** the MDA's for Cs-137, Co-60, and I-131.

4. **IF** the concentration from the reference is an MDA, **BUT** the comparison sample shows activity, **USE** the % error from the comparison **AND USE** the reference sample MDA as activity for the reference sample.

NOTE: There are no limits established when both values for a nuclide are less than MDA values.

5. **IF** both samples are MDA's, **N/A** the % error, R, Ratio and Agreement blanks.

6. **CALCULATE** the Resolution, R, for each nuclide listed on ATTACHMENT 10.6 using the following equation:

$$R = \frac{\text{Concentration}}{\text{1 sigma \% error}}$$

7. **ROUND** to the nearest whole number **AND RECORD** on ATTACHMENT 10.6.

8. **CALCULATE** the ratio using the following equation:

$$\text{Ratio} = \frac{\text{Comparison Sample Concentration}}{\text{Reference Sample Concentration}}$$

9. **ROUND** to 2 decimal places **AND RECORD** on ATTACHMENT 10.6.

10. **COMPARE** the ratios with the agreement ranges listed in Section 7.0.

11. **IF** the results are **NOT** in agreement, **NOTIFY** the E&C Supervisor or the E&C Supervisor's designee.

8.8.5 Tritium replicates are calculated as follows:

1. **RECORD** the activities of the reference sample (sample #1) and the comparison sample (sample #2) on ATTACHMENT 10.6.

2. **RECORD** the 1 sigma error for the reference sample on ATTACHMENT 10.6.

3. **IF** the concentration from the reference sample is an MDA, **BUT** the comparison sample shows activity, **USE** the error from the comparison sample **AND USE** the reference sample MDA as the activity for the reference sample.

4. **IF** the concentration from the reference is an MDA, but the comparison sample shows activity, **USE** the % error from the comparison **AND USE** the reference sample MDA as activity for the reference sample.

9.0 RECORDS

9.1 All completed Liquid Waste Release Permits **SHALL** be reviewed by an E&C staff member and approved by the E&C Supervisor or the E&C Supervisor's designee.

9.2 Final disposition of the Pre-Release Permit, Post-Release Permit, and the Liquid Waste Release Permit (ATTACHMENT 10.3 or 10.4) **SHALL** be Document Control.

9.3 ATTACHMENT 10.6 **SHALL** be reviewed by the E&C Supervisor or the E&C Supervisor's designee. Final disposition **SHALL** be Document Control.

9.4 Sample Comparison Report (CAS) (Section 8.8.3)

9.4.1 **ROUTE** the Sample Comparison Agreement Report to the E&C Supervisor or the E&C Supervisor's designee for review. Final disposition **SHALL** be Document Control.

10.0 **ATTACHMENTS**

10.1 Release Point Description

10.2 Batch Liquid Sample Request

10.3 Liquid Waste Release Permit (Batch Releases)

10.4 Liquid Waste Release Permit (Continuous Release)

10.5 Radiation Monitor Background Status

10.6 Replicate Sample and Analysis Worksheet

10.7 Post Liquid Release Review Checklist

10.8 Continuous Liquid Release Setpoint Notification

ATTACHMENT 10.1
Page 1 of 1
RELEASE POINT DESCRIPTION

Release Point Number	Release Point Description
1	Waste Condensate Tanks
2	Monitor Tanks
3	"A" Steam Generator Blowdown
4	Balance of Plant/Secondary Loses (Settling Ponds)
5	Condensate Polisher Waste Water (Turbine Sump)
6	"A" Steam Generator Drainage
7	Miscellaneous Tank and "B" Steam Generator Drainage
8	"B" Steam Generator Blowdown
9	"C" Steam Generator Blowdown
10	"C" Steam Generator Drainage

DILUTION FLOW DATA

Circ. Water Pumps in Service	Dilution Flow Rate (gpm)
1 Unit #1 Pump	50,000
2 Unit #1 Pumps	80,000
1 Unit #2 Pump	160,000
2 Unit #2 Pumps	250,000
3 Unit #2 Pumps	400,000

DISCHARGE PATHWAY DATA

Discharge Point	D.P.#	Allocation Fraction	Estimated Maximum Waste Flow Rate
Waste Disposal System	1	.25	60 gpm
Steam Generator Blowdown	2	.16/SG	160 gpm/SG
Steam Generator Drainage	2	.16/SG	250 gpm/SG
Condensate Polisher	3	.25	300 gpm

NOTE: Allocation fractions may be adjusted to accommodate actual plant operational conditions. Total concurrent allocation fractions cannot exceed 1.0.

BATCH LIQUID SAMPLE REQUEST

Part I: Operations (Request)

1. This revision is the latest revision available as verified by:

Name (Print)	Initial	Signature	Date
______________	________	______________________	______

2. Date: _________ Time: ______
3. Tank: _________ (WCT/MON/SG/MISC) Circle One
4. Tank Level: ________%
5. Recirculation Started: Date: _______ Time: ______

By: _________________
Auxiliary Operator

6. Tank: ________ verified on recirculation

By: _________________
Auxiliary Operator

7. R-18 Background _____ cpm (For WCT/MON Tk releases)
8. Number of Circulating Water Pumps _____ (Unit 1/Unit 2) circle one

Part II: Chemistry

1. Sampled By: ________________ Date: _______ Time:_____
E&C Technician
2. **NOTIFY** Operations when sampling is complete.

> **NOTE:** **ENSURE** a minimum one-hour recirculation prior to sampling any effluent batch tank.

LIQUID WASTE RELEASE PERMIT (BATCH RELEASES)

RELEASE NUMBER: ____________________ SSN: __________________ DATE: _____________

This revision is the latest revision available as verified by:

____________________	__________	____________________	______
Name (Print)	Initial	Signature	Date

PART I: RELEASE INFORMATION (E&C)

Waste Condensate Tank: A B C D E Monitor Tank: A B S/G Drainage: A B C Other................________	Estimated Release Start ______ ______ (Date, Time) Estimated Release Stop ______ ______ (Date, Time)

10CFR20 Compliance

Dilution Flow Data			**Release Rate Data**	**Monitor Data**	
Unit Involved[1]	No. of Pumps	Dilution Flow (GPM)	Max. Release Rate (GPM)	Monitor Name	Setpoint (CPM)
1 or 2	1, 2, or 3			R-	

DOSE ASSESSMENT

31 DAY DOSE PROJECTION		**10CFR50 QUARTERLY LIMIT**		**10CFR50 ANNUAL LIMIT**	
ORGAN	% LIMIT	ORGAN	% LIMIT	ORGAN	% LIMIT
TOTAL BODY		TOTAL BODY		TOTAL BODY	

Radwaste Treatment System:[2] Operable ______ Inoperable ______ (Init.) (CR 99-01075)

Tank pH:		NPDES pH limit: ≥ 6.0 (CR 99-01699)

NOTE: DO **NOT** USE UNIT #1 CIRCULATING WATER PUMPS WITHOUT AN OFFICIAL LETTER FROM UNIT #1 OPERATIONS.

Release requires E&C Supervisor Approval **IF**: (1) Any 31 day dose projection limit exceeds 90%, or (2) Any 10CFR50 Quarterly Limit exceeds 50% or (3) Any 10CFR50 Annual Limit exceeds 50%.

Prepared By: ____________________________

<u>Release Approval</u>

E&C Supervisor: ____________________________

ATTACHMENT 10.3
Page 2 of 2

LIQUID WASTE RELEASE PERMIT (BATCH RELEASES)

Release # ____

PART II: RADIATION MONITOR INFORMATION[1] (OPS and E&C)		(CR 98-00002)
Reading	R-18	R-19 ( )
Prior[4]	CPM	CPM
Source Check[5]	OPS INI.	E&C INI.
Setpoint Verified at[6]	CPM	CPM
Status Board Updated	OPS INI.	OPS INI.
Monitor Reading During Release	CPM	CPM
Monitor Reading After Release	CPM	CPM

Approved for Release: ________________________________ (CR 97-00059)
(Superintendent Shift Ops)

PART III: RELEASE INFORMATION[1] (OPS)				(CR 98-00002)
Number of Circulating Water Pumps in Service: ______ [Unit 1 or 2] (circle one)				
Release	Date	Time	Tank or SG Level	Integrator
Start				
Stop				
Difference		MIN.	GAL.	GAL.
FI-1064 (GPM)[3]		Actual Release Rate (GPM)		

1. N/A all blanks not applicable.
2. **IF** quarterly % of limit is ≥ 13 % to the total body or ≥ 12% to any organ, see ODCM Specification 2.9.1 and 2.9.2.
3. **IF** FI-1064 is out of service, estimate flow every 4 hours.
4. **IF** Rad Monitor is out of service, refer to Section 7.0 of EMP-023.
5. Source check required prior to each batch release via R-18 or R-19 A, B, or C .
6. Log actual value which the setpoint was changed to.
7. **IF** any limit is exceeded, make immediate notification to the Superintendent Shift Operations and the E&C Supervisor

Rad Monitor Information Completed By: ______________________________
(R-18: Control OPS. or R-19: E&C Tech)

Release Information Completed By: ______________/______________
(Aux. OPS/Control OPS)

Reviewed By: ______________________________
(Shift Superintendent)

POST RELEASE REVIEW

Release Posted By: ______________________________ Date: __________

Sample Composited By: ______________________________ Date: __________

____________	________	____________	________
Reviewed By	Date	E&C Supervisor	Date

LIQUID WASTE RELEASE PERMIT (CONTINUOUS RELEASE)

RELEASE NUMBER: ____________________ SSN: __________________ DATE: ____________

This revision is the latest revision available as verified by:

____________________	__________	____________________	______
Name (Print)	Initial	Signature	Date

PART I: RELEASE INFORMATION[1]			
Release Point: ____________________ (**ENTER** the appropriate Release Pathway)			
Release	Date	Time	Integrator[2]
Start			
Stop			
Difference		MIN.	
Actual Gallons Released[3]	GAL.	Average Release Rate:[4]	GPM

PART II: RADIATION MONITOR INFORMATION		
MONITOR[5]	R-	Setpoint Verified By:
SETPOINT VERF. AT[6]	CPM	
Deliver Continuous Release Setpoint Notification (Attachment 10.8): ________ (Init.)		

1. N/A all blanks not applicable
2. Log integrator readings for Condensate Polisher Waste Water Effluent integrator.
3. Net integrator difference * 100.
4. Avg. Release Rate obtained by Gallons Released divided by total minutes.
5. **IF** Rad Monitor is out of service, refer to Section 7.0 of EMP-023.
6. Log actual value which setpoint was changed to.
7. **IF** any limit is exceeded, make immediate notification to the Superintendent Shift Operations and the E&C Supervisor
8. Do **NOT** use unit #1 circulating water pumps without an official letter from unit #1 Operations.

This release can be made within the limits of 10CFR20 and 10CFR50 using the setpoints and restrictions stated herein.

Prepared By: ____________________ E&C Supervisor: ____________________

POST RELEASE REVIEW

Release Posted By[7]: ______________________________ Date: ________

____________	______	____________	______
Reviewed By	Date	E&C Supervisor	Date

ATTACHMENT 10.5
Page 1 of 1
RADIATION MONITOR BACKGROUND STATUS

Monitor	Background (cpm)
R-19A	
R-19B	
R-19C	
R-37	

DATE: ____________________

COMPLETED BY: ____________________

REPLICATE SAMPLE AND ANALYSIS WORKSHEET

Sample Point: ______________________

Reference Sample (Sample #1) Date / Time: ______________________ SSN: ______________

Comparison Sample (Sample #2) Date / Time: ______________________ SSN: ______________

Nuclide	Reference Sample (µCi/cc)	Comparison Sample (µCi/cc)	% Error	R (Resolution)	Ratio	Agreement Y/N

Comments: ____

____

Performed By: ______________________

____

Approved By: ______________________ Date: __________

E&C Supervisor

ATTACHMENT 10.7

Page 1 of 1

POST LIQUID RELEASE REVIEW CHECKLIST

Verify each item described on this ATTACHMENT is correct. Resolve any discrepancies noted during this verification.

I. Gamma Scan/Pre-Release Activity Printout

1. Both of the above documents have corresponding nuclides and activities. (Any nuclides not identified by the waste file library **MUST** be identified by "OTHER").

II. Pre/Post Release Review:

1. Correct release point used for this release (ATTACHMENT 10.1).
2. Correct recirculation start/stop times and dates (ATTACHMENT 10.2). (NA for continuous releases)
3. Pre-Release Rad Monitor Information entered correctly (ATTACHMENT 10.2 or 10.5).
4. Both Part I and Part II have corresponding circulating water pumps. (Part I may have the minimum number of pumps and Part II may have the actual number of pumps for continuous releases).
5. E&C has initialed radwaste system as being operable (Part II for batch release only).
6. Release posted with highest gallons from either tank level or integrator reading (Part II for batch releases only) (Not Applicable for continuous release).
7. **ENSURE** correct release start/stop date and time are used.
8. Both Part I and Part III have corresponding rad monitor setpoint values or Part III rad monitor setpoint value should be 1.00E06 or lower. Part III setpoint value may also be lower than Part I.
9. Release and Rad. Monitor Information sign-off complete for batch releases (Operations) or for continuous releases (E&C).
10. This release is in compliance with 10CFR20, 10CFR50 Quarterly, and 10CFR50 Annually Limits.
11. E&C Technicians Post Release Sign-Off complete.

III. Post Release/Composite Review

1. Composite Log updated with waste volume of the release per EMP-019.

CONTINUOUS LIQUID RELEASE SETPOINT NOTIFICATION[1]

Monitor	Old Setpoint (CPM)	New[2] Setpoint (CPM)	Status Board[3] Updated (OPS INITIAL)	Reason for change
R-				

[1] Batch Releases are done on the Batch Release Permit.

[2] This setpoint is valid for continuous releases only. The new setpoint is the setpoint on the Continuous Liquid Waste Release Permit maintained by E&C.

[3] The Status Board is updated using the New Setpoint.

Performed By: ____________________ ___/___/___
E&C Technician Date

Status Board
Updated By: ____________________ ___/___/___
Control Operator Date

Reviewed By: ____________________ ___/___/___
Superintendent Shift Operations Date

NOTE: ATTACHMENT 10.8 should be kept by the control operator until a new attachment is received. **ROUTE** completed ATTACHMENT 10.8 to E&C upon completion. Final disposition **SHALL** be the Plant Vault.

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM SRO-A.4

Perform an Emergency Action Level Classification and Recommend Protective Actions (EAL-1 / EPCLA-01)

CANDIDATE: ______________________________

EXAMINER: ______________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task: Perform an Emergency Action Level Classification and Recommend Protective Actions (EAL-1 / EPCLA-01)

Alternate Path: NONE

Facility JPM #: NEW

K/A Rating: 2.4.41 / 2.4.44 Importance: SRO 4.1 / 4.0 RO NA

K/A Statement: Knowledge of the emergency action level thresholds and classifications. / Knowledge of emergency plan protective action recommendations.

Task Standard: General Emergency declared due to three (3) fission product barriers jeopardized or breached AND PARs completed satisfactorily.

Preferred Evaluation Location: Simulator X In Plant ______

Preferred Evaluation Method: Perform X Simulate ______

References: Emergency Action Level Flowpath (EAL-1)
EPCLA-01, Emergency Control

Validation Time: 15 minutes Time Critical: NO

Candidate: ______________________________

Time Start: __________ Time Finish: ______

Performance Time: ______ minutes

NOTE: Performance Rating based on 20% for satisfactory classification during simulator scenario, 20% for satisfactory classification during JPM, and 60% for satisfactory protective action recommendation during JPM.

Performance Rating: SAT ______ UNSAT ______

Comments: ______________________________
____

Examiner: ______________________________ Date: ______
Signature

Tools/Equipment/Procedures Needed:

EAL-1 and EAL-2 Flowpaths
EPCLA-01

NOTE: Provide Attachments A and B of JPM to candidate as directed in JPM Steps.

NOTE: Attachment C is ONLY TO BE USED if candidate does NOT classify event as a GENERAL EMERGENCY.

READ TO OPERATOR

DIRECTION TO CANDIDATE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

Several minutes ago, the crew was performing the actions of AOP-015, "Excessive Primary Plant Leakage." Letdown had been isolated and all charging pumps were operating at maximum speed when the CRSS ordered a manual reactor trip and safety injection due to lowering RCS pressure and Pressurizer level.

The following current plant conditions are noted:

- All ESF equipment is operating.
- RCS pressure has stablized at approximately 950 psig.
- Containment pressure has risen to approximately 8 psig and has appeared to stabilize.
- An Auxiliary Operator reports there appears to be outward air flow around one of the containment penetrations.
- FRP-C.1, "Response to Inadequate Core Cooling," is being implemented.
- All SG levels are stable with AFW flow throttle to approximately 150 gpm per SG.
- The most recent RCS activity sample was 89 uCi/gm dose equivalent I-131.
- Core damage assessments are NOT yet available.
- Emergency dose projections are NOT yet available.

INITIATING CUES:

You are to classify this event in accordance with the Emergency Action Level flow paths.

START TIME: ________

STEP 1: Locates proper procedure and required information. STANDARD: Locates EAL-1 Flowpath NOTES: ***NOTE: CRITICAL steps are determined by those decision blocks which, if answered incorrectly, could cause an improper classification.*** COMMENTS:	____ SAT ____ UNSAT
STEP 2: Off Normal Condition Indicated or Observed STANDARD: Determines entry into EOP Network to be an off-normal condition NOTES: COMMENTS:	____ SAT ____ UNSAT

STEP 3:	Valid Rad Monitor Alarm?	
STANDARD:	**<YES>** Determines R-11 and R-12 are both in alarm condition	
NOTES:	***CUE: PROVIDE CANDIDATE WITH ATTACHMENT 'A', RADIATION MONITORING PANEL INDICATIONS, WHEN CANDIDATE REQUESTS RADIATION MONITOR DATA.***	____ SAT
COMMENTS:		____ UNSAT
STEP 4:	R-9 Rad Monitor Greater Than 25K mRem/hr or Increased Greater Than 5K mRem/hr in 30 minutes?	
STANDARD:	**<NO>** Determines R-9 indicates approximately 13 mRem/hr	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 5: R-11 and R-12 Rad Monitors Aligned to CV? STANDARD: **<YES>** Determines R-11 and R-12 are aligned to CV NOTES: ***NOTE: Given in initial conditions.*** COMMENTS:	____ SAT ____ UNSAT
STEP 6: R-11 Rad Monitor Greater Than 1M CPM? STANDARD: **<NO>** Determines R-11 indicating 2E4 cpm and rising slowly NOTES: COMMENTS:	____ SAT ____ UNSAT

STEP 7:	R-12 Rad Monitor Greater Than 40K CPM?	
STANDARD:	**<NO>** Determines R-12 indicating 1.8E3 cpm and rising slowly	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
STEP 8:	RCS Activity I-131 Dose Equivalent Greater Than 300 uCi/gm?	
STANDARD:	**<NO>** Determines latest RCS activity to be 89 uCi/gm	
NOTES:	***NOTE: Given in initial conditions.***	____ SAT
COMMENTS:		____ UNSAT

STEP 9:	Monitor CSFST for Information Only	
STANDARD:	Directs CRSS to monitor CSFSTs	
NOTES:	***NOTE: Given conditions included that entry has already been made to FRP-C.1, so crew is already monitoring CSFSTs.***	____ SAT
COMMENTS:		____ UNSAT
STEP 10:	Reactor Shutdown or Valid Reactor Trip Signal Present?	**CRITICAL STEP**
STANDARD:	**<YES>** Based on plant conditions, determines that a reactor trip signal has occurred	
NOTES:	**CRITICAL SINCE INCORRECTLY RESPONDING TO THIS DECISION WOULD RESULT IN IDENTIFYING FUEL AS INTACT.**	____ SAT
COMMENTS:		____ UNSAT

		CRITICAL STEP
STEP 11:	Core Exit T/Cs Greater Than 700 °F?	
STANDARD:	**<YES>** Based on entry into FRP-C.1, determines CETs are greater than 700 °F	
NOTES:	**CRITICAL SINCE INCORRECTLY RESPONDING TO THIS DECISION WOULD EVENTUALLY RESULT IN IDENTIFYING FUEL AS INTACT, ASSUMING REMAINING DECISIONS WERE RESPONDED TO CORRECTLY.** ***CONDITIONAL CUE: IF CANDIDATE ASKS FOR SPECIFIC VALUES OF CETs, PROVIDE THAT THEY ARE ALL BETWEEN 750 °F AND 770 °F.***	
COMMENTS:		____ SAT ____ UNSAT
STEP 12:	Indicate Fuel Jeopardized on FPB Status Board	
STANDARD:	Indicates that Fuel FPB is JEOPARDIZED on FPB Status Board	
NOTES:		
COMMENTS:		____ SAT ____ UNSAT

STEP 13:	RCS Leakage Greater Than Charging Capacity?	
STANDARD:	**<YES>** Determines that all charging pumps with letdown isolated could not maintain pressure or inventory in the RCS	
NOTES:	***NOTES:*** ***1) Given in initial conditions.*** ***2) Not considered to be CRITICAL decision since later determination that RCS leakage is greater than 50 gpm OR that CV pressure is greater than 2 psig would also lead to correct determination of RCS FPB even if this decision was made incorrectly.***	____ SAT
COMMENTS:		____ UNSAT
STEP 14:	Indicate Site Area Emergency on EAL Status Board	
STANDARD:	Indicates SAE on EAL Status Board	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 15: Indicate RCS Breached on FPB Status Board STANDARD: Indicates that RCS FPB is BREACHED on FPB Status Board NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 16: Primary to Secondary Leakage Greater Than Tech Specs? STANDARD: **<NO>** Determines that no indication exists that would support concluding that SG tube leakage has occurred NOTES: COMMENTS:	____ SAT ____ UNSAT

STEP 17:	Phase A or CV Ventilation Isolation Initiated or Required?	
STANDARD:	**<YES>** Based on SI signal having occurred, determines that both a Phase A and CV Vent isolation has been initiated	
NOTES:	***NOTE: Not considered critical since next decision, regarding status of Fuel and RCS FPBs, would still provide required status of CV FPB, even if this decision is made incorrectly.***	____ SAT
COMMENTS:		____ UNSAT
STEP 18:	Pathway Exists From CV Atmosphere to Environment?	**CRITICAL STEP**
STANDARD:	**<YES>** Based on report from AO, determines that pathway from the containment to atmosphere does exist	
NOTES:	**CRITICAL SINCE INCORRECTLY RESPONDING TO THIS DECISION WOULD RESULT IN IDENTIFYING CV AS INTACT.** ***NOTE: Initial conditions identified air flow from around penetration area.***	____ SAT
COMMENTS:		____ UNSAT

STEP 19: Indicate CV Breached on FPB Status Board STANDARD: Indicates that CV FPB is BREACHED on FPB Status Board NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 20: 3 FPBs Breached or Jeopardized? STANDARD: **<YES>** Determines 2 FPBs are BREACHED (RCS and CV) and the third FPB is JEOPARDIZED NOTES: **CRITICAL TO CORRECTLY DETERMINE THAT ALL 3 FPBs ARE BREACHED / JEOPARDIZED SINCE AN INCORRECT DECISION AT THIS POINT WOULD RESULT IN A SITE AREA EMERGENCY BEING DECLARED SINCE NO OTHER CONDITIONS FURTHER IN THE FLOWPATH WOULD WARRANT A GENERAL EMERGENCY.** COMMENTS:	**CRITICAL STEP** ____ SAT ____ UNSAT

STEP 21: Declare General Emergency STANDARD: Declares a General Emergency NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 22: Go To EPCLA-01 STANDARD: Goes to EPCLA-01 NOTES: ***CUE: IF CANDIDATE <u>DOES</u> DETERMINE EAL CLASSIFICATION TO BE A GENERAL EMERGENCY, DIRECT CANDIDATE TO NOW DETERMINE PROTECTIVE ACTION RECOMMENDATIONS BASED ON THIS EVENT.*** ***CONDITIONAL CUE: IF CANDIDATE <u>DOES</u> <u>NOT</u> DETERMINE EAL CLASSIFICATION TO BE A GENERAL EMERGENCY, PROVIDE CANDIDATE WITH ATTACHMENT 'C' AND DIRECT CANDIDATE TO DETERMINE PROTECTIVE ACTION RECOMMENDATIONS BASED ON THIS ATTACHED EVENT.*** ***NOTE: Although conditions are different in Attachment 'C', same process and responses are used in remainder of JPM.*** COMMENTS:	____ SAT ____ UNSAT

STEP 23:	If a General Emergency has been declared, formulate a protective Action Recommendation (PAR) using the guidance in Attachments 8.1.5.1, Initial Protective Action Recommendation Flowchart, and Attachment 8.1.5.3, PAR Affected Zones Based on Wind Direction, to formulate the initial recommendation and zones to be evacuated based on wind direction (**Step 8.1.3.12.a of EPCLA-01**)	
STANDARD:	Refers to Attachment 8.1.5.1 and 8.1.5.3 to formulate initial recommendations	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 24:	Evacuate 2 Mile Radius and 5 Miles Downwind	**CRITICAL STEP**
STANDARD:	Acquires wind direction and determines EVACUATION is required for Sectors A-0, A-1, B-1, and E-1	
NOTES:	**CRITICAL TO DETERMINE PROPER SECTORS FOR EVACUATION.** ***CUE: PROVIDE CANDIDATE WITH ATTACHMENT 'B', WIND DIRECTION AND SPEED, WHEN CANDIDATE REQUESTS INFORMATION.*** ***NOTE: Sectors determined by referencing Attachment 8.1.5.3 and identifying those sectors corresponding to SOUTHWEST wind direction. Note that Sectors A-2, B-2, and E-2 are also in the affected sectors due to wind direction, but are outside the 5-mile radius per Attachment 8.1.5.1 and only require sheltering.***	____ SAT ____ UNSAT
COMMENTS:		

STEP 25:	Shelter Remaining Sectors	**CRITICAL STEP**
STANDARD:	Determines Sectors to be sheltered include C-1, D-1, A-2, B-2, C-2, D-2, and E-2	
NOTES:	**CRITICAL TO DETERMINE PROPER SECTORS FOR SHELTERING.** ***NOTE: Sectors determined by sheltering all those Sectors within the 10-mile radius which were not evacuated.***	____ SAT
COMMENTS:		____ UNSAT
STEP 26:	Evaluate Dose Assessments Against PAGs to Determine Additional Sectors to Evacuate	
STANDARD:	Determines dose assessment not available for determination of additional evacuation	
NOTES:	***NOTE: Given in initial conditions.***	____ SAT
COMMENTS:		____ UNSAT
	END OF TASK	

STOP TIME: ________

CANDIDATE ATTACHMENT C
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

A **GENERAL EMERGENCY** has been declared following a large break loss of coolant accident.

The following conditions are noted:

- Core Exit Thermocouple temperatures are all between 1900°F and 2000°F.
- Radiochemistry analysis indicates that approximately 2.6% of the fuel volume has melted.
- RHR is injecting through the RCS cold legs.
- Containment Spray is operating with Containment Pressure at 43 psig.
- Containment hydrogen concentration is 5.5%.

Determine the Protective Action Recommendations for these conditions.

CANDIDATE ATTACHMENT B
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

WIND DIRECTION AND SPEED

- Wind Direction is from 220°.
- Wind Speed is 18 mph.

CANDIDATE ATTACHMENT A

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

RADIATION MONITORING PANEL INDICATIONS

NOTE: Assume all radiation monitors NOT included in this list are indicating at or near their normal value.

MONITOR	DESCRIPTION	READING / ALARM STATUS
R-9	Letdown Line Area	13 mR/hr / Normal (Green)
R-11 (align to CV)	CV Air and Plant Vent - Part	2E4 cpm, rising slowly / Alarm (Red)
R-12 (align to CV)	CV Air and Plant Vent - Gas	1.8E3 cpm, rising slowly / Alarm (Red)

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

Several minutes ago, the crew was performing the actions of AOP-015, "Excessive Primary Plant Leakage." Letdown had been isolated and all charging pumps were operating at maximum speed when the CRSS ordered a manual reactor trip and safety injection due to lowering RCS pressure and Pressurizer level.

The following current plant conditions are noted:

- All ESF equipment is operating.
- RCS pressure has stablized at approximately 950 psig.
- Containment pressure has risen to approximately 8 psig and has appeared to stabilize.
- An Auxiliary Operator reports there appears to be outward air flow around one of the containment penetrations.
- FRP-C.1, "Response to Inadequate Core Cooling," is being implemented.
- All SG levels are stable with AFW flow throttle to approximately 150 gpm per SG.
- The most recent RCS activity sample was 89 uCi/gm dose equivalent I-131.
- Core damage assessments are NOT yet available.
- Emergency dose projections are NOT yet available.

INITIATING CUES:

You are to classify this event in accordance with the Emergency Action Level flow paths.

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM RO-A.1-2

Perform an RCP Seal Injection Flow Determination (OP-301-1)

CANDIDATE: ______________________________

EXAMINER: ______________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task: Perform an RCP Seal Injection Flow Determination (OP-301-1)

Alternate Path: NONE

Facility JPM #: NEW

K/A Rating: 2.1.19 Importance: SRO NA RO 3.0

K/A Statement: Ability to use plant computer to obtain and evaluate parametric information on system or component status.

Task Standard: OP-301-1 Seal Injection Flow Determination completed with seal injection flow determined to be > 8.5 gpm.

Preferred Evaluation Location: Simulator X In Plant ______

Preferred Evaluation Method: Perform X Simulate ______

References: OP-301-1, Chemical and Volume Control System (Infrequent Operation)

Validation Time: 10 minutes Time Critical: NO

Candidate: ______________________________

Time Start: ________ Time Finish: ______

Performance Time: ______ minutes

Performance Rating: SAT ______ UNSAT ______

Comments: ______________________________

____

Examiner: ______________________________ Date: ______
Signature

Tools/Equipment/Procedures Needed:

OP-301-1

SIMULATOR OPERATOR INSTRUCTIONS:

1) ***Reset simulator to IC-212.***
2) ***FREEZE the simulator.***

READ TO OPERATOR

DIRECTION TO CANDIDATE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

The unit is operating at 100% power.

FI-127, RCP 'B' Seal Injection Flow has failed low.

The latest OST-051 leakage value is 0.7 gpm.

INITIATING CUES:

You are to calculate RCP 'B' Seal Injection flow in accordance with OP-301-1, "Chemical and Volume Control System (Infrequent Operation)," Section 8.4.21, starting with Step 8.4.21.2.

START TIME: ________

STEP 1: Locates proper procedure and required information.	
STANDARD: Locates OP-301-1	
NOTES: ***NOTE: A completed copy of Attachment 10.3 is included at the end of the JPM to be used as a key.***	____ SAT
COMMENTS:	____ UNSAT

STEP 2:	Complete Seal Injection Flow Calculation Attachment as follows: a. Record the parameter values in Attachment 10.3 b. Use the Instruments designated by the attachment c. Enter "N/A" in the blank for the Seal Injection Flow for the affected instrument (**Step 8.4.21.2.a through 8.4.21.2.c**)	**CRITICAL STEP**
STANDARD:	Using RTGB and ERFIS indications, determines Charging and Seal Injection flows to be: Charging (CHF0128A) **43** $\pm$ **0.5** gpm 'A' Seal Inj (FI-130) **8.5** gpm (LOCAL) 'B' Seal Inj (FI-127) enters "N/A" 'C' Seal Inj (FI-124) **8.5** gpm, (LOCAL) Determines Letdown and Seal Leakoff flows to be: Letdown (CHF0134A) **59** $\pm$ **0.5** gpm 'A' Leakoff (CHF0189A) **3.5** $\pm$ **0.2** gpm 'B' Leakoff (CHF0187A) **3.5** $\pm$ **0.2** gpm 'C' Leakoff (CHF0185A) **3.5** $\pm$ **0.2** gpm, Enters OST-51 latest leakage as 0.7 gpm.	
NOTES:	***CUE: WHEN AO CONTACTED TO DETERMINE SEAL INJECTION FLOWS, REPORT FI-130 INDICATES 8.5 GPM, FI-124 INDICATES 8.5 GPM, AND FI-127 IS FAILED LOW.*** **CRITICAL TO DETERMINE ACCURATE FLOW RATES TO ALLOW DETERMINATION OF INJECTION FLOW.** ***NOTE: Tolerances based on readability of instruments and stability of simulator conditions.***	____ SAT
COMMENTS:		____ UNSAT

STEP 3:	Sum the flows entered in the section title "Flow Into The RCS" (**Step 8.4.21.2.d**)	**CRITICAL STEP**
STANDARD:	Adds the flows into the RCS and determines them to be **60** $\pm$ **0.5** gpm	
NOTES:	**CRITICAL TO ACCURATELY CALCULATE VALUE TO ALLOW DETERMINATION OF INJECTION FLOW.** ***NOTE: Tolerance determined by adding all previously allowed tolerances.***	____ SAT
COMMENTS:		____ UNSAT
STEP 4:	Sum the flows entered in the section title "Flow Out of The RCS" (**Step 8.4.21.2.e**)	**CRITICAL STEP**
STANDARD:	Adds the flows out of the RCS and determines them to be **70.2** $\pm$ **1.1** gpm	
NOTES:	**CRITICAL TO ACCURATELY CALCULATE VALUE TO ALLOW DETERMINATION OF INJECTION FLOW.** ***NOTE: Tolerance determined by adding all previously allowed tolerances.***	____ SAT
COMMENTS:		____ UNSAT

STEP 5:	Subtract the Total Flow Into The RCS from the Total Flow Out of the RCS (**Step 8.4.21.2.f**)	**CRITICAL STEP**
STANDARD:	Subtracts flows out of the RCS from flows into the RCS to determine RCP 'B' seal injection to be 10.2 ± 1.6 gpm	
NOTES:	**CRITICAL TO ACCURATELY CALCULATE VALUE TO ALLOW DETERMINATION OF INJECTION FLOW.** ***NOTE: Tolerance determined by adding all previously allowed tolerances.***	____ SAT
COMMENTS:		____ UNSAT
STEP 6:	The Calculated Seal Injection Flow for each RCP shall be ≥ 8.5 gpm (**Step 8.4.21.3**)	
STANDARD:	Determines calculated seal injection flow to be ≥ 8.5 gpm	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
	END OF TASK	

STOP TIME: ________

EXAMINER KEY FOR JPM RO-A.1-2

ATTACHMENT 10.3
Page 1 of 1

SEAL INJECTION FLOW CALCULATION

TIME ______________

DATE ______________

FLOW INTO RCS			
INSTRUMENT	**VALUE**		
CHF0128A, RCS CHARGING FLOW (ERFIS)	8.4.21.2	**43 ± 0.5**	gpm
FI-130, RCP "A" SEAL WATER FLOW INDICATOR	8.4.21.2	**8.5**	gpm
FI-127, RCP "B" SEAL WATER FLOW INDICATOR	8.4.21.2	**N/A**	gpm
FI-124, RCP "C" SEAL WATER FLOW INDICATOR	8.4.21.2	**8.5**	gpm
TOTAL SYSTEM IN-FLOW (sum)	8.4.21.2.d	**60 ± 0.5**	gpm
FLOW OUT OF RCS			
INSTRUMENT	**VALUE**		
CHF0134A, LETDOWN FLOW (ERFIS)	8.4.21.2	**59 ± 0.5**	gpm
CHF0189A, RCP 'A" LEAKOFF FLOW FT-156A (ERFIS)	8.4.21.2	**3.5 ± 0.2**	gpm
CHF0187A, RCP 'B" LEAKOFF FLOW FT-155A (ERFIS)	8.4.21.2	**3.5 ± 0.2**	gpm
CHF0185A, RCP 'C" LEAKOFF FLOW FT-154A (ERFIS)	8.4.21.2	**3.5 ± 0.2**	gpm
Last OST-051 leakage value	8.4.21.2	**0.7**	gpm
TOTAL SYSTEM OUT-FLOW (sum)	8.4.21.2.f	**70.2 ± 1.1**	gpm

Seal Injection calculated flow = TOTAL OUTFLOW - TOTAL INFLOW

10.2 ± 1.6 gpm = **70.2 ± 1.1** - **60 ± 0.5**

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CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

The unit is operating at 100% power.

FI-127, RCP 'B' Seal Injection Flow has failed low.

The latest OST-051 leakage value is 0.7 gpm.

INITIATING CUES:

You are to calculate RCP 'B' Seal Injection flow in accordance with OP-301-1, "Chemical and Volume Control System (Infrequent Operation)," Section 8.4.21, starting with Step 8.4.21.2.

CP&L

M
Multiple
Use

CAROLINA POWER & LIGHT COMPANY
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 3
PART 2

OPERATING PROCEDURE

OP-301-1

CHEMICAL AND VOLUME CONTROL SYSTEM (INFREQUENT OPERATION)

REVISION 12

SUMMARY OF CHANGES
DCF 2000P1527

PAGE	REVISION COMMENTS
71	Change PMTR to PMT throughout procedure. (PassPort Module)

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

1.0 PURPOSE

1.1 The purpose of this procedure is to provide instructions for the Chemical and Volume Control System Infrequent Operation.

2.0 REFERENCES

2.1 Updated FSAR - Section 9.3.4

2.2 Improved Technical Specification 3.4

2.3 PLP-100, Technical Requirements Manual

2.4 Chemical and Volume Control System Purification and Makeup Flow Diagram, 5379-685

2.5 OP-603, Electrical Distribution

2.6 OP-306, Component Cooling System

2.7 OP-907, Compressed Gas System

2.8 OP-702, Waste Disposal - Gas

2.9 OP-703, Gas Analyzer

2.10 OP-919, Primary Sampling System

2.11 ACR 91-111, Delta P for Filters

2.12 NED-R-5758, RWST High Level Limitation

2.13 ACR 93-336, No Procedural Guidance Provided for Rodding Out BAST Bubblers

2.14 ACR 92-325, Starting Duty of Major Plant Motors

2.15 ESR 96-00113, Differential Pressure Finding per CR 95-02762 C/A # 4

2.16 ESR 96-00518, Flow Transmitter FT-110 Boric Acid Solidification Problem

2.17 ESR 98-00359, BAST bubbler vent

2.18 ACR 93-436, Checking Valve Tags for Valves Operated/Position Checked from the RTGB

2.19 APP-001, Miscellaneous NSSS

2.20 ESR 94-01017, Guidance for Charging Pump Packing run in

2.21 ACR 94-01811, RCP Seal Injection flow

2.22 ACR 94-01745, Charging Pump Fluid Drive oil sight glass

2.23 CR 95-00424, Both primary and secondary Heat Trace Circuit #25 OOS

2.24 CR 95-00425, Heat Trace circuit #25 Secondary declared OOS

2.25 SOER 91-01, Conduct of Infrequently Performed Test or Evolution

2.26 SOER 94-01, Conservative Decision Making

2.27 SOER 94-02, Boron Dilution Events in Pressurized Water Reactors

2.28 SOER 96-01, Control Room Supervision, Operational Decision Making and Teamwork

2.29 PLP-075, Reactivity Management

2.30 OMM-046, Control of Key Safety Functions During Shutdown

2.31 CR 95-01752, Unusual Event Declaration for Charging Pump Relief Stuck Open

2.32 ESR 95-00919, Operating Limits for Charging Line Pressure

2.33 CR 95-02968, Charging pump Break-In procedure revised

2.34 CR 95-02836, Charging pump performance reduction due to Gas Binding

2.35 CR 95-02132, Check BAST Bubbler Flow

2.36 ACR 94-00009, Boric Acid flowpath Low Temperature Alarms

2.37 PLP-037, Conduct of Infrequently Performed Tests or Evolutions

2.38 CR 96-01110, Actuation of Heat Trace alarm on CKT# 56

2.39 CR 98-02669, Procedure Usage

2.40 ESR 96-00336, Provide input on Primary & Demin water pump starting duty

2.41 ESR 96-00149, VCT Pressure Control

2.42 ESR 99-00078, Charging Pump Valve and Packing Matl. Upgrade

2.43 SOER 97-1, Potential Loss of High Pressure Injection and Charging Capability from gas Intrusion

2.44 CR 99-01525, "C" Charging Pump Gyrol Oscillation

2.45 CP&L Tech Manual 727-677-83, "Type V2-Class 2 Gyrol Fluid Drive"

2.46 ESR 99-0220, Evaluate Alternate Method of Determining Seal Injection Flow

2.47 NCR-00019225, Primary Water addition to the RCS during performance of LP-203

2.48 NCR-00020841, YIC-113 was programmed to add 612 gallons of boric acid but 940 gallons was added

3.0 RESPONSIBILITIES

N/A

4.0 PREREQUISITES

4.1 Electrical Distribution is aligned in accordance with OP-603 to the extent necessary to support CVCS operation.

4.2 The Component Cooling Loop is in service in accordance with OP-306 to the extent necessary to support CVCS operation.

4.3 Compressed Gas System is in service in accordance with OP-907 to the extent necessary to support CVCS operation.

4.4 The Waste Disposal Gas System is in service in accordance with OP-702 to the extent necessary to support CVCS operation.

4.5 The Gas Analyzer is in service in accordance with OP-703 to the extent necessary to support CVCS operation.

4.6 The Sampling System is in service in accordance with OP-919 to the extent necessary to support CVCS operation.

4.7 The Instrument Air System is in service in accordance with OP-905 to the extent necessary to support CVCS operation.

4.8 Primary Water is available in accordance with OP-915-1 to the extent necessary to support CVCS operation.

4.9 Auxiliary Heating Steam is available in accordance with OP-401 to the extent necessary to support CVCS operation.

5.0 PRECAUTIONS AND LIMITATIONS

5.1 The temperature of the Reactor Coolant Letdown, downstream of the Nonregenerative Heat Exchanger should be maintained at less than 127 °F and must **NOT** exceed 140 °F.

5.2 Initiate charging prior to initiating Letdown when the RCS temperature is greater than 200 °F to ensure that Letdown will be cooled in the Regenerative Heat Exchanger.

5.3 If the RCS is pressurized ensure that the Low Pressure Control Valve, PCV-145 is **NOT** selected for automatic control and is being manually controlled by an Operator prior to initiating Letdown.

5.4 Open only one Orifice Isolation Valve at a time and allow any induced pressure transients to subside before opening a parallel Orifice Isolation Valve.

5.5 The following precautions should be observed regarding operation of HCV-121, CHARGING FLOW: (CR 95-01752)

5.5.1 During normal operation, HIC-121 should remain in the full open position.

5.5.2 HIC-121 should only be throttled if acceptable Reactor Coolant Pump seal injection flows or positive RCP labyrinth seal differential pressures cannot be obtained using CVC-297A, B, or C.

5.5.3 Whenever HIC-121 is adjusted to reestablish the RCP labyrinth seal differential pressure, the local seal injection indicators should be checked to verify proper flow.

5.5.4 When throttling HIC-121 closed:

- Charging Pump discharge pressure will increase with TOTAL charging flow remaining the same and may result in lifting the Charging Pump discharge relief valve(s) which may not fully reseat.

- Flow may be diverted to the Reactor Coolant Pump seals as HIC-121 is throttled closed.

- Available <u>redundant</u> Charging Pump discharge pressure indication should be utilized on the RTGB, ERFIS and Local indication.

5.6 Ensure a flow path greater than the charging pump(s) capacity is maintained to prevent the discharge relief valve(s) from being challenged.

5.7 Purification of the Letdown flow with the Letdown demineralizers may be used during oxygen scavenging of the RCS with hydrazine.

5.8 Unless both Mixed Bed Demineralizers have been borated at the beginning of core life, care should be taken when placing the standby Mixed Bed Demineralizer in service to avoid an undesirable positive reactivity insertion. A new Mixed Bed Demineralizer is expected to remove approximately 110 ppm boron at the beginning and 40 ppm boron at the end of core life, as the anion resin changes from the hydroxyl form to the borate form.

5.9 The Volume Control Tank should be vented before the tank pressure approaches the high alarm point (65 psig) to avoid operation of the Volume Control Tank Relief Valve.

5.10 The optimum VCT Pressure, as read on PI-117, is 22-28 psig. This will give a Charging Pump suction pressure, as read on PI-150, 30-36 psig. (ESR96-00149, Rev 1)

5.11 A minimum of 15 psig is required in the Volume Control Tank for Reactor Coolant Pump operation.

5.12 The following limitations apply to filter operations:

- Reactor Coolant Filter maximum ΔP:20 psi.
- Seal Water Injection Filter maximum ΔP:20 psi.
- Seal Water Return Filter maximum ΔP:20 psi.
- Boric Acid Filter maximum ΔP:20 psi.
- Do **NOT** allow filters to exceed 25 psid before they are changed out. The filters should be changed when their differential pressure is between 20 and 25 psid.

5.13 The total volume of Boric Acid available in both Boric Acid Storage Tanks shall be maintained greater than or equal to 3080 gallons (TRMS 3.6). This setpoint ensures an adequate supply of boric acid is available to provide cold shutdown capability. The volume in at least one BAST should be maintained greater than or equal to 3080 gallons to allow maximum flexibility in meeting this requirement.

5.14 Upon initial startup or after maintenance operations in which air could possibly enter the Volume Control Tank, the tank must be purged with nitrogen before admitting hydrogen.

5.15 A boron chemical analysis should be performed on the Boric Acid Storage Tanks following an unexplained level change.

5.16 Notify the Superintendent Shift Operations of any unexplained tank level changes. In addition, the Plant Manager shall be notified if there is a potential safety hazard involved in the level changes.

5.17 The principles of **ALARA** shall be used in planning and performing work and operations in the Radiation Control Area.

5.18 When the heat traced piping or equipment contains 12 percent boric acid solution, the applicable heat tracing zones should be turned on, to prevent boric acid precipitation.

5.19 Before removing piping and equipment containing 12 percent boric acid solution from service, the section should first be flushed until the solution concentration is well below the solubility limit.

5.20 Before draining 12 percent boric acid from a tank, the solution must be diluted with sufficient makeup water to prevent precipitation in the drain piping.

5.21 Verify chemical composition of solution and obtain approval from the Superintendent Shift Operations before injection of chemicals.

5.22 The chemical mixing tank should be flushed with demineralized water and cleaned as necessary when changing from one chemical solution to another.

5.23 Cooling water through the Charging Pump Oil Cooler will automatically control oil inlet temperature to the cooler at 125 °F.

5.24 Oil should be added to the Charging Pumps only after the level has been checked with the pumps stopped.

5.25 The Charging Pump suction stabilizers/separators shall be vented of any noncondensibles prior to starting any of the charging pumps. A vapor bubble should be established and maintained in the steam dome while the Charging Pump is in operation.

5.26 The Charging Pump suction stabilizer/separator heater should be energized on those units whose Charging Pump is operating. All three suction stabilizer/separator heaters may be energized during normal operations. If a Charging Pump is to be removed from service for maintenance, deenergize its suction stabilizer/separator heater prior to closing the pump suction valve.

5.27 Charging pump suction stabilizer relief setpoint (75 psig) may be exceeded when the Volume Control Tank is isolated and the source of makeup is from the boric acid transfer pumps and primary water pumps.

5.28 When more than one Charging Pump is operating, only one Charging Pump should be operated in automatic to prevent the Charging Pumps from "hunting" and causing level swings.

5.29 The following starting duty limitations apply to the Charging Pump motors: (ACR 92-325)

- Maximum number of starts per hour is 4.
- Minimum time between starts is 5 minutes.

5.30 Increasing the letdown temperature to the Mixed Bed Demineralizers can cause the demineralizers to release boron, which will add negative reactivity to the Reactor. Conversely, decreasing letdown temperature to the demineralizers can cause positive reactivity to be added to the Reactor.

5.31 Equipment failures **OR** operation of the RCS Makeup system in a manner not directed by this procedure may create a flow path which could contain water at a different boron concentration and create an observable reactivity effect". (NCR-00019225)

5.32 The following starting duty limitations apply to the Boric Acid Transfer Pump motors: (ACR 92-325)

- Maximum number of starts per hour is 13.
- Minimum time between starts is 3 minutes.

5.33 Normal Seal Injection flow should be maintained at 8 to 13 gpm, however the minimum Seal Injection flow is 6 gpm and the maximum Seal Injection flow is 20 gpm. (ACR 94-01811) ITS LCO 3.4.17 requires seal injection flow of ≥ 6 gpm to each RCP when in MODES 1, 2, 3, and 4.

5.34 If the starting limitations stated below are exceeded, Primary Water Pump motor damage can occur due to motor overheating:
(REF: ACR 92-325)

- Maximum number of starts per hour is 20.

- Minimum time between starts is 2 minutes.

5.35 This procedure has been screened in accordance with PLP-037 criteria and except for sections 8.4.12, 8.4.17, 8.4.18, 8.4.19 and 8.4.20 determined **NOT** applicable (N/A) to PLP-037.

5.36 If additional Charging Pump(s) are needed to combat a casualty, HCV-121 should be opened prior to starting additional Charging Pumps to ensure the Charging Pump Relief Valves will **NOT** lift.

5.37 A Charging Pump should be operated for a minimum of 5 minutes following any start. This will ensure fully developed flow through the suction stabilizer and suction line, there by reducing possible gas buildup. Pump run of less than 5 minutes should be followed by a run on recirculation prior to the pump being placed inservice. (CR 95-02836)

5.38 The Boric Acid Storage Tanks should be recirculated at least once per day **AND** anytime additions are made to the tank(s). This will help maintain equal Boric Acid solution temperature and chemistry. (ACR 94-00009)

5.39 During Emergency condition performance of the Charging Pump Break-In After Sitting Idle section is **NOT** required to place the Charging Pump in operation.

5.40 The Pressurizer shall be OPERABLE with:

- Pressurizer Water level ≤63.3% in MODE 1;

- Pressurizer Water level ≤92% in MODE 2 and 3; and

- Pressurizer Heaters OPERABLE with a capacity of ≥ 125KW and cable of being powered from an emergency power supply.

5.41 Normally, one Mixed Bed Demineralizer is lithiated while the other is not. Experience has shown that a non-lithiated mixed bed will absorb approximately 2 ppm of Lithium per day until fully lithiated.

5.42 The Non-Lithiated Mix Bed Demineralizer is normally placed in service during an outage, while the Lithiated mix Bed is normally used during power operations. The use of Non-Lithiated Mix Bed Demineralizer during outages helps control Radiochemistry, thus reducing back ground radiation levels.

5.43 When the potentiometer setting for FCV-113A exceeds 9.0, FR-113 should be monitored closely. Based on system design characteristics, an indicated flow of 10 gpm may be greater than 10 gpm (actual) boric acid flow. This is past the range of indication available on FR-113. (NCR 00020841)

6.0 SPECIAL TOOLS AND EQUIPMENT

N/A

7.0 ACCEPTANCE CRITERIA

N/A

8.0 INSTRUCTIONS

8.1 STARTUP

None Applicable

8.2 NORMAL OPERATION

None Applicable

8.3 SHUTDOWN

None Applicable

8.4.21 Seal Injection Flow Determination

1. Initial Conditions — INIT

CAUTION

Performance of this procedure is not valid when more than one Flow Instrument (FI-124, FI-127, FI-130) is out of service.

NOTE: This section has been screened IAW PLP-037 criteria and determined to be a Case Three activity. No additional management involvement is required beyond that routinely provided by first line supervision.

a. This revision has been verified to be the latest revision available.

Name (Print)	Initial	Signature	Date

b. Verify the following conditions:

- RCS Temperature is stable. ____
- RCS Pressure is stable. ____
- PZR level is stable. ____
- Excess Letdown NOT in-service. ____

2. Complete Seal Injection Flow Calculation Attachment as follows:

a. Record the parameter values in Attachment 10.3. ____

b. Use the Instruments designated by the attachment. ____

c. Enter "N/A" in the blank for the Seal Injection Flow for the affected instrument. ____

8.4.21.2 (Continued) INIT

d. Sum the flows entered in the section title "Flow Into The RCS". ____

e. Sum the Flows entered in the section title "Flow Out of The RCS". ____

f. Subtract the Total Flow Into The RCS form the Total Flow Out of the RCS. ____

3. Acceptance Criteria

a. The Calculated Seal Injection Flow for each RCP shall be ≥8.5 gpm.

	Initials	Name(Print)	Date
Performed By:	______	______________	______
	______	______________	______

Approved By: ______________________ ______

Superintendent Shift Operations Date

Taylor, Julia

From: Taylor, Julia
Sent: Monday, January 22, 2001 1:56 PM
To: Moore, Joann
Cc: Harrison, James; Moon, Chip; McCaskill, Don
Subject: FW: LOCT Training Cycles

Joann,

I will be your training contact for the EP drills in 2001. Please let me know ASAP the scenarios you've picked from below to enhance for the drills.

Thanks,
Julia

-----Original Message-----
From: Kruger, Kurt
Sent: Wednesday, January 17, 2001 8:01 AM
To: Moore, Joann
Cc: Harrison, James; McCaskill, Don; Kirk, Michael; Taylor, Julia; Moon, Chip
Subject: RE: LOCT Training Cycles

Joann,
Sorry this reply took so long! I bet this is a real big email, (lots of bytes!!!) so you'll probably want to delete it after reading/printing/etc.
So far, here is what we have selected for Cycles 4 and 5. We may add another scenario to each cycle. These scenarios will of course have to be validated, but the contents should remain the same. Adding more malfunctions is never a problem though!!!
kurt

Cycle 4:

FSS-SEG-04 Revision 3.doc
FSS-SEG-19 Revision 5.doc
FSS-SEG-23 Revision 3.doc
FSS-SEG-34 Revision 2.doc
FSS-SEG-41 Revision 3.doc
FSS-SEG-51 Revision 0.doc

Cycle 5:

FSS-SEG-01 Revision 4.doc
FSS-SEG-12 Revision 2.doc
FSS-SEG-15 Revision 6.doc
FSS-SEG-20 Revision 5.doc

-----Original Message-----
From: Moore, Joann
Sent: Sunday, January 07, 2001 10:44 AM
To: Moon, Chip
Cc: Harrison, James; McCaskill, Don; Kirk, Michael; Kruger, Kurt; Taylor, Julia
Subject: RE: LOCT Training Cycles

The changes do not appear to affect the EP drill dates that are currently scheduled, just the operating crew.

Cycle 4
June 12, 2000
June 26, 2000

Cycle 5
August 28, 2000
September 11, 2000
September 18, 2000 (Dress Rehearsal for Team C)

If I can get an idea of what scenarios might be used during cycle 4 and Cycle 5. I can get started on plugging in EP Stuff.

-----Original Message-----
From: Moon, Chip
Sent: Friday, January 05, 2001 6:38 PM
To: Moore, Joann
Cc: Harrison, James; McCaskill, Don; Kirk, Michael; Kruger, Kurt; Taylor, Julia
Subject: LOCT Training Cycles

Joann,

I have had to revise the LOCT Schedule for 2001 due to requests from Operations. This will impact the EP Drill schedule for 2001. The new LOCT dates are included here. Note that the Ops Training 2001 Excel schedule on the LAN has NOT been updated. I cannot seem to get the Password so I can revise it. **Please call me** so I know you received this info, and we can talk further about the 2001 EP Drills and who will be the supporting instructor for the drills and graded exercise.

CYCLE 1 starts Jan 8 for 5 weeks NO EP DRILL
Course Code LOC0101R

CYCLE 2 starts Feb 19 for 5 weeks NO EP DRILL
Course Code LOC0102R

CYCLE 3 STARTUP TRAINING starts Apr 2 for 1 week (5 hr sessions) NO EP DRILL
Course Code LOC0103R

CYCLE 4 starts Jun 4 for 5 weeks EP DRILL
Course Code LOC0104R

CYCLE 5 starts Aug 20 for 5 weeks EP DRILL
Course Code LOC0105R

OCT 9, 2001, GRADED EXERCISE, NO LOCT

CYCLE 6 starts Oct 29 for 5 weeks Possible EP DRILL
Course Code LOC0106R LOCT Annual Operating Exam

CHIP MOON
LOCT Supervisor
Robinson Nuclear Plant
Caronet: 450-1633
Phone: (843) 857-1633
Fax: (843) 857-1888
Email: james.moon@pgnmail.com

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM RO-A.2

Review an Equipment Clearance
(OPS-NGGC-1301)

CANDIDATE: ______________________________

EXAMINER: ______________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task: Review an Equipment Clearance (OPS-NGGC-1301)

Alternate Path: NONE

Facility JPM #: NEW

K/A Rating: 2.2.13 Importance: SRO NA RO 3.6

K/A Statement: Knowledge of tagging and clearance tagging procedures.

Task Standard: Clearance is disapproved with both discrepancies identified.

Preferred Evaluation Location: Simulator X In Plant _______

Preferred Evaluation Method: Perform X Simulate _______

References: 5379-685, Sheet 3, CVCS Purification & Makeup
EDP-003, MCC-Buses
OPS-NGGC-1301, Equipment Clearance

Validation Time: 30 minutes Time Critical: NO

Candidate: ______________________________

Time Start: _______ Time Finish: _______

Performance Time: _______ minutes

Performance Rating: SAT _______ UNSAT _______

Comments: ____

____

Examiner: ______________________________ Date: _______
Signature

Tools/Equipment/Procedures Needed:

OPS-NGGC-1301
5379-685, Sheet 3
EDP-003

READ TO OPERATOR

DIRECTION TO CANDIDATE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

The unit is operating at 30% power.

The internals for CVC-397B, Boric Acid Transfer Pump 'B' Discharge Check Valve, must be replaced.

Boric Acid Transfer Pump 'B' has been secured and Pump 'A' is aligned for operation.

Mechanical Maintenance has submitted a clearance request. The clearance has been manually generated.

INITIATING CUES:

You are to review the Equipment Clearance Tag Sheet for CVC-397B and identify **EVERY** discrepancy.

NOTE: Individual tags have **NOT** been generated and are **NOT** part of the review process.

START TIME: ________

STEP 1: Locates proper procedure and required information. STANDARD: Locates OPS-NGGC-1301, EDP-003, and P&ID 5379-685, Sheet 3 NOTES: ***NOTES:*** ***1) Provide candidate with Attachment 1, which includes the completed clearance form.*** ***2) For clarity, the Steps in Section 9.2.1 are referenced, as applicable, in the JPM, but steps may be performed in any order provided the candidate identifies the required discrepancies.*** COMMENTS:	____ SAT ____ UNSAT
STEP 2: Secure pump/fan and hang a tag on its control switch (**Step 9.2.1.9.a**) STANDARD: Verifies tag to be hung on Boric Acid Transfer Pump 'B' RTGB and local control switches NOTES: COMMENTS:	____ SAT ____ UNSAT

STEP 3:	Remove the power source for the pump/fan prime mover (open breaker, remove fuse, shut steam supply valve and so forth) and place tag on the power source (**Step 9.2.1.9.b**)	**CRITICAL STEP**
STANDARD:	Determines power supply to Boric Acid Transfer Pump 'B' is incorrectly identified as MCC-5, Breaker 9C (**ITEM #1 - SHOULD BE MCC-6**)	
NOTES:	**CRITICAL TO IDENTIFY DISCREPANCIES TO AVOID APPROVAL OF IMPROPER CLEARANCE.**	____ SAT
COMMENTS:		____ UNSAT
STEP 4:	Reposition manual valves as required by the clearance and place tag on handwheels of the valves covered by the clearance. For pumps, shut the discharge valve before shutting the suction valve (**Step 9.2.1.9.e**)	
STANDARD:	Verifies discharge isolation valves properly identified and are SHUT before shutting the suction isolation valves - CVC-379, Boric Acid Transfer Pump 'B' Discharge - CVC-341, Boric Acid Transfer Pump 'B' Discharge to Filter - CVC-284B, Boric Acid Transfer Pump 'B' Discharge to BIT - CVC-349F, BA Pump "B" Disch Press PI-110 Root Isolation	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 5:	Reposition manual valves as required by the clearance and place tag on handwheels of the valves covered by the clearance. For pumps, shut the discharge valve before shutting the suction valve (**Step 9.2.1.9.e**)	**CRITICAL STEP**
STANDARD:	Verifies suction isolation valve CVC-334, Boric Acid Transfer Pump 'B' Suction, properly identified and SHUT after shutting the discharge isolation valves, but determines CVC-336, Primary Water to Boric Acid Transfer Pump 'B' Suction NOT included on clearance (**ITEM #2 - SHOULD BE ALSO TAGGED**)	
NOTES:	**CRITICAL TO IDENTIFY DISCREPANCIES TO AVOID APPROVAL OF IMPROPER CLEARANCE.**	____ SAT
COMMENTS:		____ UNSAT
STEP 6:	Systems, or portions of systems, and components that normally operate at temperatures and pressures above ambient should be vented and drained as necessary for the performance of work (**Step 9.2.1.24**)	
STANDARD:	Verifies drain path inside isolation boundaries to be CVC-379A, Boric Acid Transfer Pump 'B' Discharge Line Drain	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 7:	Systems, or portions of systems, and components that normally operate at temperatures and pressures above ambient should be vented and drained as necessary for the performance of work **(Step 9.2.1.24)**	
STANDARD:	Verifies vent path inside isolation boundaries to be CVC-334A, Boric Acid Transfer Pump 'B' Suction Line Vent	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
STEP 8:	Informs preparer of discrepancies	
STANDARD:	Informs preparer of 2 items: 1) Incorrect power supply listed for pump 2) Suction isolation valve missing from clearance	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
	END OF TASK	

STOP TIME: ________

ATTACHMENT 1 FOR JPM SRO-A.2

ATTACHMENT 3
Sheet 1 of 1
Operations Clearance Form

Clearance No. 01-99004

System No. 2060

1.0 Operations Approval

1.1 Equipment to be cleared CVC-397B, Boric Acid Pump 'B' Discharge Check Valve

1.2 Is a Tech Spec/ESF/Fire Protection System involved? Yes/No

T/S Ref. No. ______

1.3 **Preparer's Signature** — Prepared By — TODAY/ Date / Time

1.4 ______ Verified By — ____/____ Date / Time

2.0 Authorization to hang: Equipment may be removed from service per Clearance Tag Sheet and required documents listed in 2.1 have been activated.

2.1 Tech Spec/ESF/Fire Prdection System operability affected? Yes/No

Required Documents: ______

______ Authorized By SRO — ____/____ Date / Time

3.0 Clearance Hung. (Clearance Tag Sheet completed as requested)

______ Signature — ____/____ Date / Time

4.0 Clearance Accepted: Individual signing has verified clearance establishes adequate boundary Signature	Date/Time	Grounds Required	5.0 Clearance Completed: Equipment ready to be operated or remark made in the Special Instructions as to why not. Signature	Date/Time	Grounds Removed
1		Y/N			Y/N
2		Y/N			Y/N
3		Y/N			Y/N
4		Y/N			Y/N
5		Y/N			Y/N
6		Y/N			Y/N
7		Y/N			Y/N

6.0 Authorization to Cancel: The individuals signing Step 4.0 must sign Step 5.0 before clearances canceled.

6.1 All work completed. Ground removal authorized. — Restored Position and Order to be Restored sections prepared.

______ Signature — ____/____ Date / Time — ______ Signature — ____/____ Date / Time

6.2 Clearance removal authorized as per Tag Sheet and Precautions

______ SRO — ____/____ Date / Time

7.0 Review - Equipment Realigned as Required? Yes / NA

Clearance Removed from required documents? Yes / NA — OP WE L/U Updated? Yes / NA

______ SRO — ____/____ Date / Time

Special Instructions ______

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ATTACHMENT 1 FOR JPM SRO-A.2

ATTACHMENT 4
Sheet 1 of 1
Operations Clearance Tag Sheet

Clearance No. 01-99004

Page 1 of 1

INT	NAME (PRINT)	INT	NAME (PRINT)

* Independent Verification Required? YES NO If NO, N/A the Blocks
** N/A if Order is not Important

TAG TYPE AND #	** ORDER TO BE HUNG	COMPONENT ID/ LOCATION	CLR POSITION	ATTACHED BY (INITIAL)	IND VER	RESTORED POSITION	** ORDER TO BE RESTORED	REMOVED BY (INITIALS)*	IND VER *
1	1	'B' Boric Acid Transfer Pump / RTGB Cont Sw	Stop						
2	1	'B' Boric Acid Transfer Pump / Local Cont Sw	Stop						
3	2	52/MCC-5(9C) / E-1 Room	Off						
4	3	CVC-379 / BAT Room	Shut						
5	3	CVC-341 / BAT Room	Shut						
6	3	CVC-284B / BAT Room	Shut						
7	3	CVC-349F / BAT Room	Shut						
8	4	CVC-334 / BAT Room	Shut						
9	5	CVC-334A / BAT Room	Open						
10	5	CVC-379A / BAT Room	Cap Rem / Open						

Continued Y N

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

The unit is operating at 30% power.

The internals for CVC-397B, Boric Acid Transfer Pump 'B' Discharge Check Valve, must be replaced.

Boric Acid Transfer Pump 'B' has been secured and Pump 'A' is aligned for operation.

Mechanical Maintenance has submitted a clearance request. The clearance has been manually generated.

INITIATING CUES:

You are to review the Equipment Clearance Tag Sheet for CVC-397B and identify **EVERY** discrepancy.

NOTE: Individual tags have **NOT** been generated and are **NOT** part of the review process.

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM RO-A.3

Take Actions to Limit Radiation Exposure in Response to Radiation Alarm (AOP-005)

CANDIDATE: ______________________

EXAMINER: ______________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task: Take Actions to Limit Radiation Exposure in Response to Radiation Alarm (AOP-005)

Alternate Path: NONE

Facility JPM #: CR-068 (Modified)

K/A Rating: 2.3.10 Importance: SRO NA RO 2.9

K/A Statement: Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.

Task Standard: Action of AOP-005, Attachment 12, have been completed satisfactorily.

Preferred Evaluation Location: Simulator X In Plant ____

Preferred Evaluation Method: Perform X Simulate ____

References: AOP-005, Radiation Monitoring System
APP-036, Auxiliary Annunciator

Validation Time: 10 minutes Time Critical: NO

Candidate: ____________________

Time Start: ________ Time Finish: ________

Performance Time: ________ minutes

Performance Rating: SAT ________ UNSAT ________

Comments: ____________________

____

Examiner: ____________________ Date: ________
Signature

Tools/Equipment/Procedures Needed:

APP=036
AOP-005

SIMULATOR OPERATOR INSTRUCTIONS:
1) ***Reset simulator to IC-213.***
2) ***Align R-11/R-12 selector switch to CV position.***
3) ***Insert RMS XMTR OVR for R-12 to a value resulting in high radiation alarm.***
4) ***FREEZE the simulator.***

READ TO OPERATOR

DIRECTION TO CANDIDATE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

The unit is operating at 100% power.

AOP-016, "Excessive Primary Plant Leakage," is being performed.

An emergency containment entry has just been made to determine the plausibility of isolating the leak.

APP-036-D8, PROCESS MONITOR HI RAD, has just alarmed.

INITIATING CUES:

You are to respond to the Process Monitor radiation alarm in accordance with APP-036, "Auxiliary Annunciator."

START TIME: ________

STEP 1: Locates proper procedure and required information STANDARD: Locates APP-036 NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 2: Determine process channel in alarm condition STANDARD: Determines alarming channel is R-12, PROCESS MONITOR R-11/R-12 CV AIR AND PLANT VENT NOTES: COMMENTS:	____ SAT ____ UNSAT

START TIME: ________

STEP 3:	Perform the following to determine if the alarm is valid: 1) Momentarily depress the ALARM/RESET pushbutton (**Step 3.1**)	
STANDARD:	Depresses ALARM/RESET pushbutton	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
STEP 4:	If the alarm returns, THEN refers to AOP-005 (**Step 3.2**)	
STANDARD:	Determines alarm returns and goes to AOP-005, Attachment 12	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 5:	Check R-11/R-12 Selector Switch - SELECTED TO CV (**Step 1**)	
STANDARD:	Determines R-11/R-12 selector to be selected to CV position	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
STEP 6:	Check Personnel - IN CV (**Step 2**)	
STANDARD:	Determines personnel in CV	
NOTES:	***NOTE: Initial conditions indicated emergency entry in progress.***	____ SAT
COMMENTS:		____ UNSAT

STEP 7:	Place VLC Switch To EMERG Position (**Step 3**)	**CRITICAL STEP**
STANDARD:	VLC switch placed in EMERG position	
NOTES:	**CRITICAL TO ALLOW SOUNDING EVACUATION ALARM.**	____ SAT
COMMENTS:		____ UNSAT
STEP 8:	Depress And Hold CV EVACUATION HORN Pushbutton For 15 SECONDS (**Step 4**)	**CRITICAL STEP**
STANDARD:	Depresses and holds CV evacuation horn pushbutton for 15 seconds	
NOTES:	**CRITICAL TO ALERT PERSONNEL IN CONTAINMENT.**	____ SAT
COMMENTS:		____ UNSAT

STEP 9:	Announce The Following Over Plant PA System: "ATTENTION ALL PERSONNEL. ATTENTION ALL PERSONNEL. A HIGH RADIATION ALARM HAS BEEN RECEIVED ON CV VENT PROCESS MONITOR, R-11 (R-12). ALL NON-ESSENTIAL PERSONNEL EVACUATE CV UNTIL FURTHER NOTICE" (**Step 5**)	**CRITICAL STEP**
STANDARD:	Announces condition requiring evacuation, stating alarm is on R-12	
NOTES:	**CRITICAL TO ALERT PERSONNEL TO HIGH RADIATION CONDITION.**	____ SAT
COMMENTS:		____ UNSAT
STEP 10:	Repeat CV Evacuation Announcement Over PA System (**Step 6**)	
STANDARD:	Repeats announcement	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 11: Place VLC Switch To NORM Position (**Step 7**) STANDARD: Returns VLC switch to NORM position NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 12: Check CONTAINMENT VENTILATION ISOLATION Valves - CLOSED (**Step 8**) STANDARD: Determines containment ventilation isolation valves closed by position indication or status lights NOTES: COMMENTS:	____ SAT ____ UNSAT

STEP 13:	Place The Following CV IODINE REMOVAL FAN Control Switches To PREPURGE Position: - HVE-3 - HVE-4 (**Step 9**)	**CRITICAL STEP**
STANDARD:	Places switches for HVE-3 and HVE-4 to PREPURGE position and verifies proper operation by fan and damper indication	
NOTES:	**CRITICAL TO ESTABLISH OPERATION OF SYSTEM.**	____ SAT
COMMENTS:		____ UNSAT
STEP 14:	Check RCS Temperature - GREATER THAN 200°F (**Step 10**)	
STANDARD:	Determines RCS temperature to be normal operating temperature for 100% power	
NOTES:	***NOTE: May check RTGB indications or recognize that unit is operating at 100% power conditions.***	____ SAT
COMMENTS:		____ UNSAT

STEP 15:	Request RC To Perform A Background Radiation Check At Radiation Monitors R-11 AND R-12 (**Step 11**)	
STANDARD:	Contacts RC personnel to perform background check	
NOTES:	***CUE: RC PERSONNEL WILL PERFORM BACKGROUND CHECKS AT R-11 AND R-12.***	____ SAT
COMMENTS:		____ UNSAT
STEP 16:	Determine If Primary System Leakage Is Occurring (**Step 12**)	
STANDARD:	Determines leakage is occurring (may recommend to CRSS the performance of AOP-016)	
NOTES:	***NOTE: Initial conditions stated entry made to determine location of leakage.***	____ SAT
COMMENTS:		____ UNSAT

STEP 17:	Go To The Main Body, Step 1, Of This Procedure (**Step 14**)	
STANDARD:	Goes to main body, Step 1, of AOP-005	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
STEP 18:	Implement The EALs (**Main Body, Step 2**)	
STANDARD:	Informs SSO of need to implement the EALs	
NOTES:	***CUE: SSO ACKNOWLEDGES INFORMATION.***	____ SAT
COMMENTS:		____ UNSAT
	END OF TASK	

STOP TIME: ________

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

The unit is operating at 100% power.

AOP-016, "Excessive Primary Plant Leakage," is being performed.

An emergency containment entry has just been made to determine the plausibility of isolating the leak.

APP-036-D8, PROCESS MONITOR HI RAD, has just alarmed.

INITIATING CUES:

You are to respond to the Process Monitor radiation alarm in accordance with APP-036, "Auxiliary Annunciator."

CP&L

R
Reference Use

CAROLINA POWER & LIGHT COMPANY
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 3
PART 6

ANNUNCIATOR PANEL PROCEDURE

APP-036

AUXILIARY ANNUNCIATOR

REVISION 32

SUMMARY OF CHANGES

PANEL	REVISION COMMENTS
E2 & E3	Added SOER 99-1Rec 2a as a reference.

AUXILIARY ANNUNCIATOR

	1	2	3	4	5	6	7	8	9	10
A	CH A ICCM SYS MALF	CH B ICCM SYS MALF		S/G BLOWDN/ WET LAYUP TROUBLE	CONDENSATE POLISHER TROUBLE	CHEMICAL FEED TROUBLE			COND BALL CLEANING SYSTEM TROUBLE	
B	N-51 FULL RANGE MONITOR TROUBLE	N-52 FULL RANGE MONITOR TROUBLE		SPENT FUEL PIT HI/LO TEMP	SPENT FUEL PIT HI LEVEL	SPENT FUEL PIT LO LEVEL		PORV RV1-1 STM DUMP DEFEAT	PORV RV1-2 STM DUMP DEFEAT	PORV RV1-3 STM DUMP DEFEAT
C	ICCM HI TEMP		UPS TROUBLE					N_2 SYS HDR PRESS	CV N_2 HDR HI/LO PRESS	
D	BATT CHARGER A/A-1 TROUBLE	BATT CHARGER B/B-1 TROUBLE	BATT A/B LO VOLT	BATT C UNDER VOLT	BATT C GROUND DETECTION		AREA MONITOR HI RAD	PROCESS MONITOR HI RAD		CRDM RM HI TEMP
E		230KV SWYD VOLTAGE STPT DEV	SUT PRI OVER/UNDER VOLTAGE	LOSS OF POWER SUT VOLT MONITOR		RMS TO ERFIS MUX TROUBLE	RAD MONITOR TROUBLE	ACCIDENT MONITOR HI RAD		CABLE RM HI/LO TEMP
F	WASTE EVAP B TROUBLE	WASTE EVAP A TROUBLE	AUX BOILER A/B TROUBLE							BATT RM A/B HI/LO TEMP
G	GAS STRIPPER A TROUBLE	GAS STRIPPER B TROUBLE			ANNUN INVERTER FAILURE		DS DG TROUBLE	DS BUS OVER VOLT/ GROUND		BATT RM FAN A NO AIR FLOW
H	WDBRP TROUBLE	BA HEAT TRACE TROUBLE	BA EVAP TROUBLE		ANNUN SYS DC PWR LOST	DS BUS SUPPLY BKR 52/32A TRIP	52/32A SI/UV BYPASS	DS BUS UNDER VOLT		BATT RM FAN B NO AIR FLOW
I				LPMS TROUBLE	SEISMIC ALARM		EMERG DC 480V BUS 2B & 3 AVAILABLE	EMERG DC 4KV BUS 3 & 4 AVAILABLE		
J	BATCHING TANK HI TEMP	BATCHING TANK LO TEMP	BATCHING TANK LO LEVEL	ERFIS TROUBLE		SHUTDOWN EQUIP IN LOCAL CONT	52/15B LOCAL CONTROL	52/16B LOCAL CONTROL	CCW PMP A LOCAL CONTROL	SW PMP D LOCAL CONTROL
K				PA SYS CKT BKR TRIPPED		52/15 LOCAL CONTROL	52/17 LOCAL CONTROL	52/19 LOCAL CONTROL	TEST	ACK
L	PROT RACK DOOR OPEN	PROT RACK TEST PANEL COVER OPEN	PROT RACK IN TEST		CV PERSONNEL HATCH DOOR OPEN	V6-12D LOCAL CONTROL	SD AFW PMP V1-8A BKR LOCAL CONTROL	SD AFW PMP V2-14A BKR LOCAL CONTROL		

ALARM

PROCESS MONITOR HI RAD *** WILL REFLASH ***

AUTOMATIC ACTIONS/CAUSES

CHANNEL	AUTO ACTION	CAUSE
R-11 R-12	1) HVE-1A **AND** HVE-1B stop. 2) V12-6 closes 3) V12-7 closes 4) V12-8 closes 5) V12-9 closes 6) V12-10 closes 7) V12-11 closes 8) V12-12 closes 9) V12-13 closes	RCS leak
R-14C	RCV-014 closes.	WGDT leak or Safety lift
R-18	RCV-018 closes.	WDS Effluent leakage
ALL	V1-31 closes.	Primary to Secondary leak
R-19A	1) FCV-1930A **AND** B close. 2) FCV-1933A **AND** B close. 3) FCV-4204A closes.	
R-19B	1) FCV-1931A **AND** B close. 2) FCV-1934A **AND** B close. 3) FCV-4204B closes	
R-19C	1) FCV-1932A **AND** B close. 2) FCV-1935A **AND** B close. 3) FCV-4204C closes.	
R-21	HVE-15 stops.	Fuel Handling accident. Low level in SFP.

OBSERVATIONS

1. Reading on affected channel(s)

ACTIONS

1. Observe affected radiation monitor for radiation levels **AND** evidence of short term spiking.
2. **IF** short term spiking is evidenced, **THEN** allow the indicated level to decrease prior to performing step 3.
3. Perform the following to determine if the alarm is valid:
   1) Momentarily depress the ALARM/RESET pushbutton.
   2) **IF** the alarm returns, **THEN** refer To AOP-005.
   3) **IF** the alarm fails to return, **THEN** initiate action to determine the reason for the alarm.
      - Troubleshoot and repair channel
      - Investigate area for transient radioactive material
4. **IF** the affected radiation monitor is determined to be inoperable, **THEN** perform applicable Required Actions **OR** Compensatory Measures IAW ITS LCO 3.3.6, ODCM 2.6, **AND** ODCM 3.10.

DEVICE/SETPOINTS

1. Refer to OMM-014, Radiation Monitor Setpoints.

POSSIBLE PLANT EFFECTS

1. Radioactive release
2. Personnel overexposure

REFERENCES

1. AOP-005, Radiation Monitoring System
2. OMM-014, Radiation Monitor Setpoints
3. CWD B-190628, 83C
4. ODCM 2.6 and 3.10
5. ITS Table 3.3.6-1 Item 3, LCO 3.4.15,

CONTINUOUS USE

CAROLINA POWER & LIGHT COMPANY
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
PLANT OPERATING MANUAL
VOLUME 3
PART 5
ABNORMAL OPERATING PROCEDURE

AOP-005

RADIATION MONITORING SYSTEM

REVISION 19

Effective Date: __________

RECOMMENDED BY: ______________________________ __________
Procedure Sponsor Date

APPROVED BY: ______________________________ __________
Manager - Operations Date

LIST OF EFFECTIVE PAGES

EFFECTIVE PAGES	REVISION
Cover Sheet	19
LEP	19
3 through 56	19

Summary of Changes

Attachments 2, 7, 10, & 12: Replaced OMM-046 with OMM-033 since CV closure has been moved to OMM-033.

Attachment 5: Changed name from Pneuma Seal to Cavity Seal.

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED

1. PURPOSE

To provide instruction in the event of high radiation alarm on any plant Process, Area, or Accident Radiation Monitors.

2. ENTRY CONDITIONS

a. A valid alarm condition exists on one or more Plant Process, Area, or Accident Radiation Monitors.

b. Any alarm on Radiation Monitor R-38.

- END -

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED

1. Use Non-Performed Attachment(s) Listed Below For Radiation Monitor(s) In Alarm:

RADIATION CHANNEL	AREA MONITOR	ATTACHMENT NUMBER	PAGE
R-1	CONTROL ROOM	1	7
R-2	CV AREA	2	8
R-3	PASS PANEL AREA	3	10
R-4	CHARGING PUMP ROOM	4	12
R-5	SPENT FUEL PIT AREA	5	14
R-6	SAMPLING ROOM	6	17
R-7	INCORE INSTRUMENT ROOM	7	19
R-8	DRUMMING STATION	8	21
R-9	LETDOWN LINE AREA	9	22
R-32A R-32B	CV HIGH RANGE	10	24
R-33	MONITOR BLDG AREA MONITOR	11	26

(CONTINUED NEXT PAGE)

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED

1. (CONTINUED)

RADIATION CHANNEL	PROCESS MONITOR	ATTACHMENT NUMBER	PAGE
R-11 R-12	PROCESS MONITOR R-11/R-12 CV AIR AND PLANT VENT	12	27
RI-14A RI-14B RI-14C RI-14D RI-14E	PLANT EFFLUENT PARTIC PLANT EFFLUENT IODINE PLANT EFFLUENT NG LO PLANT EFFLUENT NG MID PLANT EFFLUENT NG HI	13	30
R-15	CONDENSER AIR EJECTOR GAS	14	32
R-16	HVH COOLING WATER RADIOACTIVE LIQUID	15	33
R-17	COMPONENT COOLING WATER RADIOACTIVE LIQUID	16	36
R-18	LIQUID WASTE DISPOSAL EFFLUENT	17	37
R-19A	STEAM GEN BLOW DN S/G A	18	39
R-19B	STEAM GEN BLOW DN S/G B	19	41
R-19C	STEAM GEN BLOW DN S/G C	20	43
R-20 R-30	FUEL HANDLING BLDG LOWER LEVEL	21	45
R-21	FUEL HANDLING BLDG UPPER LEVEL	22	47

(CONTINUED NEXT PAGE)

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED

1. (CONTINUED)

RADIATION CHANNEL	**PROCESS MONITOR**	**ATTACHMENT NUMBER**	**PAGE**
R-22A R-22B R-22C	E&RC BUILDING LAB HOODS AND RESPIRATOR ROOM HOOD EXHAUST PARTICULATE E&RC BUILDING LAB HOODS AND RESPIRATOR ROOM HOOD EXHAUST IODINE E&RC BUILDING LAB HOODS AND RESPIRATOR ROOM HOOD EXHAUST NOBLE GAS	23	48
R-23A R-23B R-23C	RADWASTE BUILDING EXHAUST PARTICULATE RADWASTE BUILDING EXHAUST IODINE RADWASTE BUILDING EXHAUST NOBLE GAS	24	49
R-31A	STEAMLINE RADIATION MONITOR	25	50
R-31B	STEAMLINE RADIATION MONITOR	26	51
R-31C	STEAMLINE RADIATION MONITOR	27	52
R-37	CONDENSATE POLISHER WASTE	28	53
R-38A R-38B R-38C	TSC/EOF BUILDING VENTILATION PARTICULATE TSC/EOF BUILDING VENTILATION IODINE TSC/EOF BUILDING VENTILATION NOBLE GAS	29	55

2. Implement The EALs

3. Refer To Technical Specifications To Determine Any Applicable LCOs

4. Return To Procedure And Step In Effect

- END -

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED

ATTACHMENT 12

PROCESS MONITOR R-11/R-12 - CV AIR & PLANT VENT

(Page 1 of 3)

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED
1.	Check R-11/R-12 Selector Switch - SELECTED TO CV	Contact E&RC to perform the following, as appropriate: • Collect gas samples to determine source of alarm. • Survey Auxiliary Building and Fuel Handling Building for source of activity. • Perform background radiation check at Radiation Monitors R-11 and R-12. Go To the main body, Step 1, of this procedure.
2.	Check Personnel - IN CV	Go To Step 8.
3.	Place VLC Switch To EMERG Position	
4.	Depress And Hold CV EVACUATION HORN Pushbutton For 15 SECONDS	
5.	Announce The Following Over Plant PA System: "ATTENTION ALL PERSONNEL. ATTENTION ALL PERSONNEL. A HIGH RADIATION ALARM HAS BEEN RECEIVED ON CV VENT PROCESS MONITOR, R-11 (R-12). ALL NON-ESSENTIAL PERSONNEL EVACUATE CV UNTIL FURTHER NOTICE"	
6.	Repeat CV Evacuation Announcement Over PA System	
7.	Place VLC Switch To NORM Position	

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED

ATTACHMENT 12

PROCESS MONITOR R-11/R-12 - CV AIR & PLANT VENT

(Page 2 of 3)

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED
8.	Check CONTAINMENT VENTILATION ISOLATION Valves - CLOSED	Perform the following: a. Depress H.V. OFF on R-11 OR R-12 to initiate Containment Ventilation Isolation. b. IF any CONTAINMENT VENTILATION ISOLATION Valve fails to close, THEN locally verify penetration is isolated from outside CV.
9.	Place The Following CV IODINE REMOVAL FAN Control Switches To PREPURGE Position: • HVE-3 • HVE-4	
10.	Check RCS Temperature - GREATER THAN 200°F	Initiate CV closure using OMM-033, Implementation Of CV Closure.
11.	Request RC To Perform A Background Radiation Check At Radiation Monitors R-11 AND R-12	

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED

ATTACHMENT 12

PROCESS MONITOR R-11/R-12 - CV AIR & PLANT VENT

(Page 3 of 3)

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED
12.	Determine If Primary System Leakage Is Occurring, As Follows: • Check RCS Level - UNEXPLAINED DECREASE OR • RCS Leak - LOCALLY IDENTIFIED OR • VCT Auto Makeups - EXCESSIVE OR • Charging Pump Speed - INCREASING	Go To the main body, Step 1, of this procedure.
13.	Go To AOP-16, Excessive Primary Plant Leakage, While Continuing With This Procedure	
14.	Go To The Main Body, Step 1, Of This Procedure	

- END -

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM RO-A.4

Activate the Emergency Response Data System from the Control Room (EPCLA-01)

CANDIDATE: ______________________________

EXAMINER: ______________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task: Activate the Emergency Response Data System from the Control Room (EPCLA-01)

Alternate Path: NONE

Facility JPM #: NEW

K/A Rating: 2.4.43 Importance: SRO NA RO 2.8

K/A Statement: Knowledge of emergency communication systems and techniques.

Task Standard: ERDS has been connected to NRC Operations Center.

Preferred Evaluation Location: Simulator X In Plant ____

Preferred Evaluation Method: Perform X Simulate ____

References: EPCLA-01, Emergency Control

Validation Time: 5 minutes Time Critical: NO

Candidate: ____________________

Time Start: ________ Time Finish: ________

Performance Time: ________ minutes

Performance Rating: SAT ________ UNSAT ________

Comments: ____________________

____

Examiner: ____________________ Date: ________
Signature

Tools/Equipment/Procedures Needed:

EPCLA-01

SIMULATOR OPERATOR INSTRUCTIONS:
1) Reset simulator to IC-5.
2) Ensure ERDS is NOT operational (ERDS = NORMAL is NOT displayed at the bottom of the ERFIS terminal to be used).
3) Ensure ERFIS terminal is selected to a screen other than the ERDS activation screen.

READ TO OPERATOR

DIRECTION TO CANDIDATE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

A Site Area Emergency has been declared.

INITIATING CUES:

You are to verify that the Emergency Response Data System (ERDS) is providing data to the NRC Operations Center in accordance with EPCLA-01, "Emergency Control."

START TIME: ________

STEP 1:	Locates proper procedure and required information.	
STANDARD:	Locates EPCLA-01, Step 8.1.3.14	
NOTES:	***NOTE: Procedure steps are not included in this JPM since required actions fall under 2 procedure steps containing bullets.***	
COMMENTS:		____ SAT ____ UNSAT
STEP 2:	Display the ERDS activation screen by: - Depressing the ERDS key on the ERFIS keyboard, or - Typing the Turn-On-Code "ERDS" at the input field, or - Selecting ERDS from the EP Menu	**CRITICAL STEP**
STANDARD:	Displays the ERDS activation screen by any acceptable method	
NOTES:	**CRITICAL TO ALLOW MAKING ERDS OPERATIONAL.**	
COMMENTS:		____ SAT ____ UNSAT

STEP 3:	When the ERDS Control and Status Display window appears, click on the green “Start ERDS” button	**CRITICAL STEP**
STANDARD:	Clicks on green START ERDS button when ERDS Control and Status Display screen appears	
NOTES:	**CRITICAL TO ALLOW MAKING ERDS OPERATIONAL.**	____ SAT
COMMENTS:		____ UNSAT
STEP 4:	An “Are You Sure” message is displayed. Click yes to initiate ERDS, click no to cancel.	**CRITICAL STEP**
STANDARD:	Clicks on YES to initiate ERDS	
NOTES:	**CRITICAL TO ALLOW MAKING ERDS OPERATIONAL.**	____ SAT
COMMENTS:		____ UNSAT

STEP 5:	Observe the "Start ERDS" button changes to a yellow "Starting..." button.	
STANDARD:	Verifies that START ERDS button changes from green to yellow button which states STARTING	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
STEP 6:	When ERDS connects to the NRC Operations Center the yellow "Starting..." button will change to a red "Stop ERDS" button.	
STANDARD:	Verifies that STARTING button changes from yellow to red button which states STOP ERDS	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 7:	Within five minutes after activation, the ERDS function should become operational. This is determined by ERDS = NORMAL message displayed at the bottom of an ERFIS terminal.	
STANDARD:	Verifies ERDS operational by display at bottom of ERFIS terminal stating ERDS = NORMAL	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
	END OF TASK	

STOP TIME: ________

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

A Site Area Emergency has been declared.

INITIATING CUES:

You are to verify that the Emergency Response Data System (ERDS) is providing data to the NRC Operations Center in accordance with EPCLA-01, "Emergency Control."

CP&L

R
Reference Use

CAROLINA POWER & LIGHT COMPANY
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 2
PART 5

EMERGENCY PROCEDURE

EPCLA-01

EMERGENCY CONTROL

REVISION 9

SUMMARY OF CHANGES

Step	Description of Change
8.1.2.4	Changed generic procedure reference EPOSC-00 to more precise reference EPOSC-04.
8.1.3.3	Changed generic procedure reference EPNOT-00 to more precise reference EPNOT-01.
8.1.3.4b	Changed generic procedure reference EPSPA-00 to more precise reference EPSPA-02.
8.1.3.11	Added guidance for evacuation assembly locations.

TABLE OF CONTENTS

8.1.1 **PURPOSE**

1. To provide consolidated guidance for classifying emergencies from the Control Room or Technical Support Center (TSC).

8.1.2 **RESPONSIBILITIES**

1. The Site Emergency Coordinator (SEC) has immediate and unilateral authority to implement this procedure.

2. The SEC may not delegate:

    a. the decision to notify offsite authorities;

    b. making offsite Protective Action Recommendations (PAR); and

    c. reclassifying or terminating the emergency.

3. The responsibility to notify offsite authorities and making offsite Protective Action Recommendations transfer to the Emergency Response Manager (ERM) upon activation of the Emergency Operations Facility (EOF).

4. The SEC may authorize exposure in excess of routine yearly limits for saving of life or protecting valuable equipment per EPOSC-04, Emergency Work Control.

8.1.3 **INSTRUCTIONS**

1. Enter the Emergency Action Level (EAL) flowpath, EAL-1, at the first step and determine the appropriate classification.

2. Declare or validate the highest classification of emergency determined.

    a. Announce to Control Room or TSC personnel that you are assuming the position of SEC.

8.1.3 (Continued)

3. Direct the Emergency Communicator to prepare for communication activities in accordance with EPNOT-01, CR/EOF Emergency Communicator.

4. Determine if there are any personnel injuries;

   a. Give priority to lifesaving activities over radiological exposure control, authorize exposures in excess of normal limits if required.

   b. Refer to EPSPA-02, First Aid and Medical Care, for additional guidance on first aid and transportation of contaminated injured personnel.

5. Determine if onsite protective actions are necessary;

   a. Evaluate radiological, chemical and other situations which may require evacuation.

   b. If evacuation or administration of potassium iodide is necessary, implement EPSPA-01, Evacuation and Accountability, or EPSPA-03, Administration of Potassium Iodide, respectively.

6. Request any offsite assistance necessary;

   a. The Unit 2 Control Room should contact Darlington County 911 Center for fire, police or ambulance service.

   b. Logistics personnel may contact the 911 Center if Control Room staff are unable to request assistance.

   c. Contact other agencies as necessary, selected offsite agency numbers are maintained in the Emergency Response Organization (ERO) phone book.

8.1.3 (Continued)

7. Activate appropriate Emergency Response Facilities (ERFs) as noted below:

    a. **IF** all of the following occurs;

        - The Start-up Transformer is lost.
        - Backfeed through the Auxiliary Transformer is possible.
        - Only 1 (one) Emergency Diesel is powering its respective bus.

        THEN staff all of the **onsite** Emergency Response Facilities to assist with back feed logistics.

    b. For Unusual Event - no activation is required, facilities may be activated at SEC discretion.

    c. For Alert - activate TSC, EOF and OSC. Joint Information Center (JIC) activation is at SEC or ERM discretion.

    d. For Site Area and General Emergency - Activate all onsite and offsite facilities.

        – If the initial classification was an Alert or below and has escalated to Site Area Emergency or above, initiate scenario 41 to call out JIC non-beeper personnel per EPNOT-01.

8. Determine habitability of facilities for directing ERO personnel to the primary or alternate location via PA, pager code, etc.

9. For an Alert only, if the casualty has abated prior to or during notification of offsite agencies, ERO pagers and facilities need not be activated.

    a. If no facility activation is desired, modify the upcoming Public Address (PA) announcement with do not activate the Technical Support Center (TSC), Emergency Operations Facility (EOF), or Operations Support Center (OSC).

8.1.3 (Continued)

10. Sound applicable alarms and perform a PA announcement with the "VLC" switch in "Emergency" position;

    a. Announce "**Attention all personnel, attention all personnel, a(n) <u>(give emergency declared)</u> has been declared. The cause of the emergency is**

       ____

       ____

       ____

       __________________________. **Use of the plant public address is restricted to Emergency Communications only until further notice.**

       If Emergency Response Facilities are being activated announce
       "All EOF/TSC/OSC personnel report to your designated facility."

    b. Repeat announcement(s) and alarm (if sounded).

11. If a Site Area or General Emergency has been declared a site evacuation is mandatory unless doing so will jeopardize the safety of plant personnel. To evacuate the site, sound the site evacuation alarm for approximately 15 seconds, and announce "**All Non-Emergency Response personnel report to (<u>give appropriate upwind location</u>) immediately. "All Joint Information Center personnel report to your facility.**"

    - Repeat announcement(s) and alarm (if sounded).
    - To avoid confusion site evacuation should only be initiated once.
    - Designated locations are: (others may be used if necessary)

      East - Building 110 next to Lake Robinson or parking lot.

      West - Unit 2 Administrative Building Cafeteria or parking lot.

8.1.3 (Continued)

12. If a General Emergency has been declared, formulate a protective Action Recommendation (PAR).

    a. Use guidance in Attachments 8.1.5.1, Initial Protective Action Recommendation Flowchart and Attachment 8.1.5.3, PAR Affected Zones Based on Wind Direction to formulate the initial recommendation and zones to be evacuated based on wind direction.

    b. Subsequent PARs are made by comparing dose projections and environmental monitoring results to Attachment 8.1.5.2, Protective Action Guidelines (PAG) and upgrading the initial recommendations as necessary.

13. Develop and transmit an initial Emergency Notification Form to at least one State and County agency within 15 minutes of emergency declaration.

    a. Follow up notifications are required at least every 30-60 minutes.

14. Within one hour of an Alert (or above) declaration, activate the Emergency Response Data System (ERDS) as noted below:

    a. If the ERDS is not currently operational (ERDS = NORMAL is not displayed at the bottom of an ERFIS terminal), the SEC will ensure that ERDS is activated. Any problems should be reported to Information Technology personnel.

    b. Display the ERDS activation screen by:

       - Depressing the ERDS key on the ERFIS keyboard, or
       - Typing the Turn-On-Code "ERDS" at the input field, or
       - Selecting ERDS from the EP Menu.

8.1.3.14 (Continued)

c. When the ERDS Control and Status Display window appears, click on the green “Start ERDS” button.

- An “Are You Sure” message is displayed. Click yes to initiate ERDS, click no to cancel.
- Observe the “Start ERDS” button changes to a yellow “Starting...” button.
- When ERDS connects to the NRC Operations Center the yellow “Starting...” button will change to a red “Stop ERDS” button.
- Other buttons are provided to review system status and data transmissions.
- It may take several minutes for the system status in the Control and Status Display window or at the bottom of the screen to update.

d. Within five minutes after activation, the ERDS function should become operational. This is determined by ERDS = NORMAL message displayed at the bottom of an ERFIS terminal.

e. If ERDS fails to become operational (ERDS = NORMAL is not displayed on an ERFIS Terminal) within five minutes, stop the ERDS function by clicking the red “Stop ERDS” button and notify onsite Information Technology.

15. If the Emergency Response Facility Information System/Electronic Display System (ERFIS/EDS) is out of service initiate manual transfer of safety parameter and other relevant data.

a. Forms for recording data are located in EPNOT-00, "Notification and Emergency Communications.

8.1.3 (Continued)

16. Continue to assess the plant status against the EALs to confirm, upgrade or downgrade the emergency classification.

    a. If the State and County facilities have been activated, they should be consulted prior to any downgrade of emergency classification.

17. If the TSC is activating, perform a turnover with the TSC SEC.

    a. A turnover checklist is provided as Attachment 8.1.5.4, Turnover Checklist.

18. Perform PA announcements periodically to update personnel in the field of any changing plant conditions.

19. When appropriate based on plant conditions, coordinate with any offsite agencies which have activated and terminate the emergency.

    a. Direct the Emergency Communicator to make termination notifications to all agencies.

        – Termination, as a change in classification, has a 15 minute time requirement.

    b. If not previously terminated by the Nuclear Regulatory Commission (NRC), coordinate the termination of ERDS.

8.1.4 **RECORDS**

N/A

8.1.5 **ATTACHMENTS**

8.1.5.1 Initial Protective Action Recommendation Flowchart

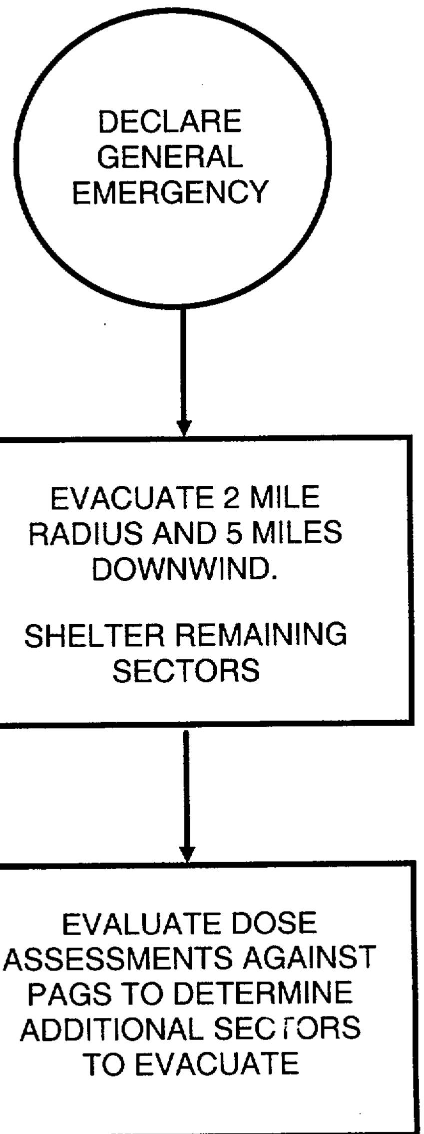
8.1.5.2 EPA Protective Action Guide for the Early Phase

8.1.5.3 PAR Affected Zones Based on Wind Direction

8.1.5.4 Turnover Checklist

ATTACHMENT 8.1.5.1

INITIAL PROTECTIVE ACTION RECOMMENDATION FLOWCHART



INITIAL PROTECTIVE ACTION RECOMMENDATION FLOWCHART
PAR REFERENCE GUIDE AND DOCUMENTATION FORM

RULES FOR PROTECTIVE ACTION RECOMMENDATIONS

1. SHELTER ALL REMAINING SECTORS NOT EVACUATED.

2. A PROTECTIVE ACTION RECOMMENDATION MAY NOT BE REDUCED FROM THE INITIAL RECOMMENDATION FOR ANY SECTOR UNTIL THE RELEASE IS TERMINATED AND THE DECISION IS COORDINATED WITH THE STATE AND COUNTIES.

3. A PROTECTIVE ACTION REQUIRED FOR ANY PORTION OF A SECTOR REQUIRES THAT ACTION BE IMPLEMENTED FOR THE ENTIRE SECTOR.

RECOMMENDATION

PLACE A √ IN THE APPROPRIATE BLANK FOR EACH SECTOR.

------------2 MILE RADIUS-----------

EVACUATE	SHELTER	SECTOR
______	______	A-0

------------5 MILE RADIUS------------

EVACUATE	SHELTER	SECTOR
______	______	A-1
______	______	B-1
______	______	C-1
______	______	D-1
______	______	E-1

------------10 MILE RADIUS------------

EVACUATE	SHELTER	SECTOR
______	______	A-2
______	______	B-2
______	______	C-2
______	______	D-2
______	______	E-2

RECOMMENDED BY / TIME: ______________ / ______
RCD OR RCM

APPROVED BY / TIME: ______________ / ______
SEC OR ERM

EPA PROTECTIVE ACTION GUIDE (PAGS)

FOR THE EARLY PHASE*

PROTECTIVE ACTION	PAG	COMMENTS
Evacuate	1 Rem TEDE	Change any sheltering subzones/sectors to evacuate if the Total Effective Dose Equivalent dose within any area exceeds PAG.
Evacuate	5 Rem CDE	Change any sheltering subzones/sectors to evacuate if the Committed Dose Equivalent dose to the thyroid within any area exceeds PAG.

*The Early Phase is the time between the beginning of an incident and when the incident source and releases have been brought under control.

Reference: EPA 400-R-92-001, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents," U.S. Environmental Protection Agency, Washington, D.C., May 1992

PAR AFFECTED ZONES BASED ON WIND DIRECTION

(EVACUATION TIME IN MINUTES)[2]

WIND FROM	POTENTIALLY[1] AFFECTED SECTORS	WINTER WEEKDAY, FAIR WEATHER	WINTER WEEKNIGHT, FAIR WEATHER	SUMMER WEEKDAY, FAIR WEATHER	WINTER WEEKDAY, ADVERSE WEATHER
North (338° - 022°)	A-0, B-1, B-2, C-1, C-2, D-1, D-2	225	180	210	295
Northeast (023° - 067°)	A-0, C-1, C-2, D-1, D-2, E-1, E-2	225	180	210	295
East (068° - 112°)	A-0, D-1, D-2, E-1, E-2	225	180	210	295
Southeast (113° - 157°)	A-0, A-1, A-2, D-1, E-1, E-2	225	180	210	295
South (158° - 202°)	A-0, A-1, A-2, B-1, B-2, E-1, E-2	225	180	210	295
Southwest (203° - 247°)	A-0, A-1, A-2, B-1, B-2, E-1, E-2	225	180	210	295
West (248° - 292°)	A-0,A-1, A-2, B-1, B-2, C-1, C-2	225	180	210	295
Northwest (293° - 337°)	A-0, B-1, B-2, C-1, C-2, D-2	225	180	210	295
	ALL ZONES (10 MILE RADIUS)	240	180	215	315

1. Minimum recommendation for General Emergency is A-0 (2 mile radius) and affected (downwind) 5 mile radius sectors.

2. Times listed are estimates based on evacuation times listed in the Emergency Plan.

NOTE:	Conditions identified represent most limiting conditions.

TURNOVER CHECKLIST

This checklist is guidance for turning over Emergency Response activities from one facility to another or between personnel holding Emergency Response positions.

NOTE: Blanks are provided for place keeping √'s only, logs are the official record.

A. SYNCHRONIZE CLOCKS to ERFIS/EDS TIME ________

B. ONSITE SITUATION

1. Review Emergency Classification, basis for declaration, and mitigating actions. ________

   a. Review status of safety equipment and systems.
   b. Review status of fission product barriers.
   c. Review condition/stability of reactor.
   d. Review any Emergency Action Levels exceeded.
   e. Review cause, history, initiating events leading to declaration of emergency.

2. Review onsite protective actions taken. ________

   a. Assembly
   b. Shelter
   c. Evacuations (Local, Protected Area, Site, Exclusion Area)

NOTE: If there is a Site Evacuation, Unit 1 may need to continue operating.

   d. Potassium Iodide Administration
   e. Complete PLP-015 Overtime Form for ERO as appropriate.

TURNOVER CHECKLIST

3. Review status of offsite assistance requested for the site. ________

    a. Fire Department

    b. Rescue Squad

    c. Local Law Enforcement Agency

C. OFFSITE SITUATION

1. Review Status of Offsite Notifications. ________

    – State and County initial and any follow-up messages

    – NRC

    – Other: ANI, INPO, Westinghouse

    – Any needed notifications that have not been made

2. Review Protective Action Recommendations made and notifications made to the State and Counties. ________

3. Review any status received from the State or Counties regarding activation, readiness, protective actions, or requests for information. ________

4. Review data on any projected or actual radiological releases. ________

5. Review the time and content of any press releases or media briefing. ________

TURNOVER CHECKLIST

D. EMERGENCY RESPONSE

1. Review status of Emergency Response Organization Activation. ________
   - Notifications made to off-duty and offsite personnel. ________
   - Emergency Response Facilities that are activated. ________
   - Emergency Response Facilities that will be activated. ________
   - Other notifications needed. ________
2. Review outside organizations requested to mobilize. ________
3. Review assistance needed. ________

E. TURNOVER COMPLETED ________

Facility: **RNP** Scenario Number: 1 Op-Test Number: ______

Examiners

______

______

______

Operators

______

______

______

Objectives: To evaluate the candidate's ability to perform a power reduction from 100% power. To evaluate the candidates' ability to respond to a failure of the selected first stage pressure transmitter and a trip of a HDP, requiring a power reduction to < 85% power. During the power reduction, the candidates will be evaluated on their ability to control reactivity. The candidates will be evaluated on their ability to respond to a pressurizer pressure transmitter failure and a charging pump trip. A sequence of events will result in a loss of heat sink event coincident with an ATWS. Post-trip complications will include a failure of one PORV to open when feed and bleed initiated.

Initial Conditions: IC-201, 100% power MOL; Equipment OOS is AFW Pump 'A' and SI Pump 'A'. SI Pump 'B' is aligned to Train 'A'.

Turnover: Power is 100% at MOL. Severe thunderstorms have been reported in the area. A 0.2 gpm tube leak exists in SG 'A'.

AFW Pump 'A' has been out of service for 4 hours to allow maintenance to perform stator insulation checks. Technical Specification 3.7.4 has been entered and 164 hours remain before a shutdown to Mode 3 would be required.

SI Pump 'A' has been out of service for 26 hours for bearing inspections. SI Pump 'B' is aligned to Train 'A' in accordance with OP-202.

RM-31B is out of service.

Boron concentration is 791 ppm. Bank D rods are at 218 steps.

Shift orders are to commence a power power reduction to 75% for condenser air leakage troubleshooting.

Event Number	Malfunction Number (1)	Event Type*	Event Description
1	NA	BOP(N) SRO(N)	Commence Plant Power Reduction
		RO(R) SRO(R)	Reactivity Control During Power Reduction

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor
(1) See Attachment, "Simulator Setup & Actions Required for Scenario," for details on setup.

Event Number	Malfunction Number	Event Type*	Event Description
2	ICOR PT:446 0 90 Asls	BOP(I) SRO(I)	Selected First Stage Pressure Transmitter (446) Failure Low
3	IMF CFW12A	BOP(C) SRO(C)	Heater Drain Pump 'A' Trip
	NA	RO(R) SRO(R)	Reactivity Control During Response to Heater Drain Pump Trip
4	ICOR PT:444 2500 180 Asls	RO(I) SRO(I)	Controlling Channel of Pressurizer Pressure (444) Failure High
5	IMF CVC05A	RO(C) SRO(C)	Charging Pump 'A' Trip
6	IMF CFW24 6e+06 5:00 Asls	RO(M) BOP(M) SRO(M)	Loss of Main Feedwater due to Feed Header Break
	IMF EPS05B IMF EDG03B	RO(M) BOP(M) SRO(M)	Fault on 480V Bus E2 with Lockout of EDG
	IMF CFW01C	RO(M) BOP(M) SRO(M)	Overspeed Trip of SDAFW Pump
7	IMF RPS01A 2 3 IMF RPS01B 2 3	RO(M) BOP(M) SRO(M)	Failure of Reactor to Trip from Control Room
8	IMF PRS03C	RO(C) SRO(C)	Failure of PRZ PORV (446) to Open
9	NA	SRO	Classify the Event

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor
(1) See Attachment, "Simulator Setup & Actions Required for Scenario," for details on setup.

Simulator Setup & Actions Required for Scenario # 1

Event Number	Simulator Operator Actions	
INITIAL CONDITIONS	IC-201, 100% power MOL. Equipment OOS is AFW Pump 'A' and SI Pump 'A'. RM-31B is also OOS. Insert a 0.2 gpm tube leak on SG 'A'. SI Pump 'B' is aligned to Train 'A'. Event 7 inserted prior to start of scenario.	
1	NA	Plant Power Reduction and Control of Reactivity - **NO MALFUNCTIONS REQUIRED**
2	ICOR PT:446 0 90 Asls	Selected First Stage Pressure Transmitter (446) Failure Low
3	IMF CFW12A	Heater Drain Pump 'A' Trip Requiring Power Reduction to <85% and Control of Reactivity
4	ICOR PT:444 2500 180 Asls	Controlling Channel of Pressurizer Pressure (444) Failure High
5	IMF CVC05A	Charging Pump 'A' Trip
6	IMF CFW24 6e+06 5:00 Asls	Loss of Main Feedwater due to Feed Header Break
	IMF EPS05B IMF EDG03B	Fault on 480V Bus E2 with Lockout of EDG Resulting in Loss of MDAFW Pump 'B' - **INSERT UPON ACTUATION OF AFW DUE TO LOW SG LEVEL**
	IMF CFW01C	Overspeed Trip of SDAFW Pump - **INSERT UPON ACTUATION OF AFW DUE TO LOW SG LEVEL**
7	IMF RPS01A 2 3 IMF RPS01B 2 3	Failure of Reactor to Trip from Control Room - **INSERTED PRIOR TO START OF SCENARIO**
8	IMF PRS03C	Failure of PRZ PORV (446) to Open - **INSERT UPON REACTOR TRIP BREAKERS OPENED LOCALLY**
9	NA	Classify the Event - **NO MALFUNCTIONS REQUIRED**

SHIFT TURNOVER SCENARIO # 1

Power is 100% at MOL. Severe thunderstorms have been reported in the area. A 0.2 gpm tube leak exists in SG 'A'.

AFW Pump 'A' has been out of service for 4 hours to allow maintenance to perform stator insulation checks. Technical Specification 3.7.4 has been entered and 164 hours remain before a shutdown to Mode 3 would be required.

SI Pump 'A' has been out of service for 26 hours for bearing inspections. SI Pump 'B' is aligned to Train 'A' in accordance with OP-202.

RM-31B is out of service.

Boron concentration is 791 ppm. Bank D rods are at 218 steps.

Shift orders are to commence a power power reduction to 75% for condenser air leakage troubleshooting.

Op-Test Number: ________ Scenario Number: 1 Event Number: 1

Event Description: ***Power Reduction with Reactivity Control***

Time	Position	Applicant's Actions or Behaviors
	SRO	Directs the actions of GP-006, "Normal Plant Shutdown From Power Operation to Hot Shutdown"
	RO	Establish additional letdown flow as desired by: - Start an additional charging pump, if necessary - Place an additional letdown orifice in service
	BOP	Reduce turbine load as follows: - If desired to decrease load with EHC controls in IMP IN, then 1) Depress the IMP IN pushbutton and check that IMP IN is illuminated 2) Check the IMP OUT pushbutton is extinguished - Set the desired load in the SETTER - Select the desired Load Rate - Depress the GO pushbutton
	RO	Verify proper programming of the following: - Tavg tracks within 5 °F of Tref - PZR level tracks within 5% of reference level
	RO	Borate as necessary in accordance with OP-301, "Chemical and Volume Control System"

Op-Test Number: ____	Scenario Number: 1	Event Number: 1
Event Description: ***Power Reduction with Reactivity Control (BORATION)***		

Time	Position	Applicant's Actions or Behaviors
	RO	Place the RCS MAKEUP MODE selector switch in BORATE.
	RO	IF desired, THEN, place controller FCV-113A, BORIC ACID FLOW, in MAN AND adjust the Controller by using the UP/DOWN arrow pushbuttons to adjust FCV-113A Controller output to 30-50%.
	RO	Set the BORIC ACID TOTALIZER, YIC-113, to the desired quantity as follows: 1) Depress BUTTON "A". 2) Depress "CLR" BUTTON. 3) Key in the desired quantity AND depress the "ENT" BUTTON.
	RO	***NOTE: The following step will open FCV-113A, BA TO BLENDER, and FCV-113B, BLENDED MU TO CHG SUCT, and will start a Boric Acid Pump.*** Place the RCS MAKEUP SYSTEM switch in START.
	RO	IF desired, THEN manually adjust controller FCV-113A, BORIC ACID FLOW, using the UP and DOWN arrow pushbuttons to establish the desired Boric Acid flow rate.

Op-Test Number: ________ Scenario Number: 1 Event Number: 1

Event Description: ***Power Reduction with Reactivity Control (BORATION)***

Time	Position	Applicant's Actions or Behaviors
	RO	WHEN the desired amount of Boric Acid has been added to the RCS, THEN verify the following: - FCV-113A, BA TO BLENDER, closes - FCV-113B, BLENDED MU TO CHG SUCT, closes - The BORIC ACID PUMP stops - The RCS MAKEUP SYSTEM is off
	RO	IF desired, THEN flush the Boric Acid flow path
	RO	Return the RCS Makeup System to automatic operation by performing the following: 1) Verify controller FCV-113A, BORIC ACID FLOW, in AUTO. 2) Place RCS MAKEUP MODE selector switch in AUTO. 3) Place RCS MAKEUP SYSTEM switch in START.
	RO	Record, in AUTO LOG, the total amount of Boric Acid added during the boration operation as indicated by BORIC ACID TOTALIZER, YIC-113. ***NOTE: AUTO LOG is not functional in simulator.***

Op-Test Number: ________ Scenario Number: 1 Event Number: 2

Event Description: ***First Stage Pressure Transmitter (446) Failure Low***

Time	Position	Applicant's Actions or Behaviors
	BOP / RO	Diagnoses low failure of First Stage Pressure Transmitter PT-446 - Rods stepping inward - PI-446 indication failing low - TR-408 green pen lowering - APP-006-D4/E4/F4, SG A/B/C STM LINE HI FLOW, illuminated - APP-006-F5, STEAM DUMP ARMED, illuminated - APP-005-F5, AMSAC TROUB/BYPD, illuminated - APP-003-D4, TAVG/TREF DEV, illuminated
	SRO	Enters and directs the actions of AOP-025, "RTGB Instrument Failure," Section H, for "Turbine First Stage Pressure Transmitter Failure"
	BOP	***IMMEDIATE ACTION*** Check SG level trend controlling in AUTO to 39% or place affected FRV controllers in MAN and restore SG level to between 39% and 52%
	RO	***IMMEDIATE ACTION*** Manually control Reactor Power and Tavg as follows: - Place the Rod Control Selector Switch in Manual - Operate rods to maintain Reactor Power less than 100%.
	BOP	If not previously performed, place all FRV Controllers in MAN

Op-Test Number: ________ Scenario Number: 1 Event Number: 2

Event Description: ***First Stage Pressure Transmitter (446) Failure Low***

Time	Position	Applicant's Actions or Behaviors
	BOP	Place the 1ST STAGE PRESSURE Selector Switch to the Alternate channel by placing it in the PT-447 position
	BOP	Restore each SG level to program level
	BOP	***CONTINUOUS ACTION*** When SG level is within 1% of programmed level, then place the FRV Controllers back in AUTO
	RO	***CONTINUOUS ACTION*** When Tavg is within +0.5 to -2.5 °F of Tref and Axial Offset is within the Target Band, then place the Rod Control Selector Switch back to AUTO
	SRO	Direct the actions of OWP-033, FSP-1, "First Stage Pressure Transmitter PT-446," to remove 446 from service

Op-Test Number: ________ Scenario Number: 1 Event Number: 2

Event Description: ***First Stage Pressure Transmitter (446) Failure Low***

Time	Position	Applicant's Actions or Behaviors
	SRO	***SELECTED PRECAUTIONS*** 1) Refer to ITS Table 3.3.1-1 Item 17e and Table 3.3.2-1 Items 1f, 1g, 4d, and 4e for applicability and operability requirements. 5) Ensure that either all safeguards bistables for Lo Tavg and Lo Steam Pressure are clear OR the Hi Steam Flow SI signal is blocked (IF plant conditions permit). 8) PT-446 input to AMSAC Processor Channels "A" AND "B" should be BYPASSED using the POWER 1 BYPASS switches located on the AMSAC cabinet.
	BOP	Perform the following RTGB switch alignment: - STEAM DUMP CONTROL MODE SELECTOR SWITCH in STEAM PRESS MODE - 1ST STAGE PRESSURE SELECTOR SWITCH 446/447 in SELECTED TO 447
	BOP	Verify APP-006-F5, STEAM DUMP ARMED, is illuminated
	SRO	Direct the tripping of the following bistables in the Hagan Racks - 70% Turbine Load Limit - Permissive P7 - Loop 1 High Steam Flow - Loop 2 High Steam Flow - Loop 3 High Steam Flow
		SIMULATOR OPERATOR INSTRUCTIONS: Bistables to be tripped by inserting MRF BST101 D_OPEN (door open), MRF BST099 TRIP (turbine load limit), MRF BST09 TRIP (P-7), MRF BST016 TRIP (loop 1 high steam flow), MRF BST018 TRIP (loop 2 high steam flow), MRF BST020 TRIP (loop 3 high steam flow), and MRF BST101 D_CLOSED (door closed).

Op-Test Number: ______ Scenario Number: 1 Event Number: 2

Event Description: ***First Stage Pressure Transmitter (446) Failure Low***

Time	Position	Applicant's Actions or Behaviors
	SRO	Direct bypassing the AMSAC input from PT-466 by the following switch alignment: - AMSAC Bypass Switch POWER 1, PROCESSOR 'A' to BYPASSED - AMSAC Bypass Switch POWER 1, PROCESSOR 'B' to BYPASSED
		SIMULATOR OPERATOR INSTRUCTIONS: Actions to insert are MRF RPS001 BYPASS (processor 1 bypass) and MRF RPS005 RESET (AMSAC reset).
	SRO	Return to Main Body of procedure (AOP-025)
	SRO	Implement the EALs
	SRO	Refer to Technical Specifications - TS Table 3.3.1-1 Item 17e, RPS Instrumentation (1 hour to verify interlock is in required state) - TS Table 3.3.2-1 Items 1f, 1g, 4d, and 4e, ESFAS Instrumentation (6 hours to trip bistables)

Op-Test Number: ________ Scenario Number: 1 Event Number: 3

Event Description: ***Heater Drain Pump 'A' Trip***

Time	Position	Applicant's Actions or Behaviors
	BOP	Diagnoses trip of Heater Drain Pump 'A' - Heater Drain Pump 'A' control switch green light illuminated - APP-007-A5, HDT PMP A MOTOR OVLD/TRIP, illuminated - APP-007-B6, HDT HI/LO LVL
	SRO	Enters and directs the actions of AOP-010, "Main Feedwater / Condensate Malfunction"
	BOP	***IMMEDIATE ACTION*** Check FRVs controlling properly in AUTO or take manual control of affected FRV(s) and control level by matching feed flow and steam flow
	SRO	If a reactor trip point is being approached, then direct a reactor trip and transition to PATH-1
	SRO	Determines appropriate step to perform for HDP trip
	BOP	Based on combination of running pumps, reduce turbine load at 1%/min to 5%/min to achieve reactor power less than the Target Power of 85%

Op-Test Number: ______	Scenario Number: 1 Event Number: 3
Event Description: ***Heater Drain Pump 'A' Trip***	

Time	Position	Applicant's Actions or Behaviors
	BOP	Check Main FW Pumps - TWO PUMPS RUNNING
	BOP	***CONTINUOUS ACTION*** Monitor Condensate Pump header pressure on PI-1458 and if pressure decreases to less than 300 psig, then verifiy open HCV-1459
	BOP	***CONTINUOUS ACTION*** Check APP-007-B6, HDT HI/LO LVL, extinguished
	BOP	Check HCV-1459, LP HEATERS BYP, closed
	BOP	If SG level is NOT at or trending to program level, then take manual control of the FRVs, restore level, match feed and steam flows, and then place FRVs back in AUTO
	RO	If Tavg is NOT at or trending to Tref, then place Rod Control Selector switch in manual, restore Tavg to within +0.5 to -2.5 °F of Tref, then place switch back in AUTO

Op-Test Number:		Scenario Number: 1	Event Number: 3	
Event Description: *Heater Drain Pump 'A' Trip*				

Time	Position	Applicant's Actions or Behaviors
	SRO	Contact Maintenance to troubleshoot and correct the feedwater problem
	SRO	Implement the EALs
	SRO	If power change greater than 15% in one hour, then implement TS SR 3.4.16.2 for Iodine sampling requirements
	RO	***CONTINUOUS ACTION*** Check APP-005-B5, ROD BANKS A/B/C/D LO LIMIT, extinguished
	RO	Monitor AFD to ensure compliance with TS 3.2.3
	SRO	Notify Load Dispatcher of the Unit's load capability

Op-Test Number: ________ Scenario Number: 1 Event Number: 4

Event Description: ***Pressurizer Pressure Transmitter (444) Failure High***

Time	Position	Applicant's Actions or Behaviors
	RO	Diagnoses high failure of Pressurizer Pressure Transmitter PT-444 - PI-444 indication increases - Spray valves open - PC-444J demand increases - PI-458 (demand meter) increases - PR-444 red pen increases - PORV PCV-455C opens - APP-003-D8, PZR CONTROL HI/LO PRESS, illuminated - APP-003-C7, PZR PRESS CONTROLLER HI OUTPUT, illuminated - APP-003-C3, PRT HI PRESS, illuminated - APP-003-D6, PZR PORV/SAFETY VLV OPEN, illuminated - APP-003-E6, PZR PORV LN HI TEMP, illuminated - APP-003-F6, PZR SAFETY VLV LINE HI TEMP, illuminated
	SRO	Enters and directs the actions of AOP-025, "RTGB Instrument Failure," Section C, for "Pressurizer Pressure Transmitter Failure"
	RO	***IMMEDIATE ACTION*** Check either PZR PORV open
	RO	***IMMEDIATE ACTION*** Close the open PORV

Op-Test Number: ______ Scenario Number: 1 Event Number: 4

Event Description: ***Pressurizer Pressure Transmitter (444) Failure High***

Time	Position	Applicant's Actions or Behaviors
	RO	***IMMEDIATE ACTION*** Check PT-444 is failed transmitter
	RO	***IMMEDIATE ACTION*** Control PZR Pressure Controller PC-444J as follows: - Place PC-444J in MAN - Restore PZR pressure to the desired control band
	RO	Verify PCV-455C in AUTO
	RO	Verify Selector Switch PM-444 selected to operable channel - REC 445
	SRO	Return to Main Body of procedure (AOP-025)
	SRO	Implement the EALs

Op-Test Number: ______ Scenario Number: 1 Event Number: 4

Event Description: ***Pressurizer Pressure Transmitter (444) Failure High***

Time	Position	Applicant's Actions or Behaviors
	SRO	Refer to Technical Specifications - TS 3.4.1, DNB Parameters (2 hours to restore pressure above 2205 psig)

Op-Test Number: ________ Scenario Number: 1 Event Number: 5

Event Description: ***Charging Pump 'A' Trip***

Time	Position	Applicant's Actions or Behaviors
	RO	Diagnoses trip of Charging Pump 'A' - Charging Pump 'A' control switch green light illuminated - APP-003-F5, CHG PMP MOTOR OVLD/TRIP, illuminated
	SRO	Enters and directs the actions of APP-003-F5, CHG PMP MOTOR OVLD/TRIP
	RO	Start standby Charging Pump.
	SRO	Dispatch Operator to check the Charging Pump 'A' breaker at 480V Bus DS
	SRO	Dispatch Operator to check the Charging Pump(s)
	SRO	Refers to Technical Specifications - TS 3.4.17, Chemical and Volume Control System (still have 2 operable pumps)

Op-Test Number: ______	Scenario Number: 1	Event Number: 6		

Event Description: ***Loss of Secondary Heat Sink Concurrent With ATWS (AOP-010 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	CREW	Diagnoses Main Feedwater Header Break - SG levels decreasing - Main Feed FCVs opening - Rods stepping inward (may occur) - Tavg increasing - PI-1420 (FW header pressure) decreasing - LI-1417A (hotwell level) decreasing - APP-007-D5, FW HDR LO PRESS, illuminated - APP-006-A3/B3/C3, SG A/B/C LVL DEV, illuminated - APP-007-A7, HOTWELL LO LVL, illuminated
	SRO	Enters and directs the actions of AOP-010, "Main Feedwater / Condensate Malfunction"
	BOP	***IMMEDIATE ACTION*** Check FRVs controlling properly in AUTO or take manual control of affected FRV(s) and control level by matching feed flow and steam flow
	SRO	If a reactor trip point is being approached, then direct a reactor trip and transition to PATH-1
	SRO	Determines appropriate step to perform for pipe break

Op-Test Number: ________	Scenario Number: 1	Event Number: 6
Event Description: ***Loss of Secondary Heat Sink Concurrent With ATWS (AOP-010 ACTIONS)***		

Time	Position	Applicant's Actions or Behaviors
	BOP	***CONTINUOUS ACTION*** Attempt to match steam flow with feed flow as follows: - Reduce turbine load at 1%/min to 5%/min to match steam to feed flow
	SRO	Dispatch an operator to locate and attempt to isolate the break
	SRO	Based on plant conditions, direct a manual Reactor Trip if an automatic trip has not yet occurred
	RO	Attempts manual Reactor Trip and informs SRO that reactor will NOT trip
	SRO	Enters PATH-1 and immediately transitions to and directs the actions of FRP-S.1, "Response to Nuclear Power Generation / ATWS"

Op-Test Number: ________ Scenario Number: 1 Event Number: 6

Event Description: ***Loss of Secondary Heat Sink Concurrent With ATWS (FRP-S.1 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	RO	***IMMEDIATE ACTION*** - Depress both Reactor Trip pushbuttons - Insert Control Rods - Dispatch an operator to the MG Set Room to trip the following breakers: REACTOR TRIP BREAKER 'A' REACTOR TRIP BREAKER 'B' GENERATOR 'A' CIRCUIT BREAKER GENERATOR 'B' CIRCUIT BREAKER - Dispatch an operator to 480V Buses 2B and 3 to trip the following breakers: ROD DRIVE MOTOR GENERATOR SET 'A' ROD DRIVE MOTOR GENERATOR SET 'B' **CRITICAL TASK TO ASSURE REACTOR SHUTDOWN TO PREVENT POTENTIAL CORE DAMAGE.**
		SIMULATOR OPERATOR INSTRUCTIONS: Approximately 1 minute after being dispatched, insert DMF RPS01A (removes malfunction), DMF RPS01B (removes malfunction), MRF EPS097 RACK_OUT (open MG set breaker) and MRF EPS104 RACK_OUT (open MG set breaker).
	BOP	***IMMEDIATE ACTION*** Check Turbine Trip as follows: - BOTH Turbine Stop Valves CLOSED, or - All Governor Valves CLOSED
	BOP	While verifying all AFW Pumps running, determines that NO AFW Pumps are running ***- AFW Pump 'A' under clearance*** ***- AFW Pump 'B' no power to E-2*** ***- SDAFW Pump trip*** ***NOTE: SRO may contact Maintenance for assistance or to determine status of AFW Pump 'A' work.***

Op-Test Number:		Scenario Number: 1	Event Number: 6	
Event Description:	***Loss of Secondary Heat Sink Concurrent With ATWS (FRP-S.1 ACTIONS)***			

Time	Position	Applicant's Actions or Behaviors
	RO	Initiate Emergency Boration as follows: - Verify Charging flowpath established CVC-310B, LOOP 2 COLD LEG CHG, is open HIC-121, CHARGING FLOW Controller, demand signal at 0% - Verify 2 Charging Pumps running (only 1 running) ***- Charging Pump 'A' previously tripped*** ***- Charging Pump 'C' no power to E-2*** - Verify Boric Acid Pump aligned for blend is RUNNING - Verify MOV-350, BA TO CHARGING PMP SUCT, is OPEN - Check flow indicated on FI-110, BORIC ACID BYPASS FLOW - Check Charging flow to RCS on FI-122A
	RO	Verify CONTAINMENT VENTILATION ISOLATION is INITIATED
	BOP	***CONTINUOUS ACTION*** If an SI Signal occurs, then verify auto start of all SI equipment using Supplement 'L'
		NOTE: NEXT 4 PAGES OF SCENARIO ADDRESS SUPPLEMENT 'L' ACTIONS FOR SI ACTUATION (PAGE HEADER IDENTIFIES THESE PAGES). CONTINUATION OF FRP-S.1 ACTIONS ARE LOCATED IMMEDIATELY FOLLOWING SUPPLEMENT 'L' ACTIONS.

Op-Test Number: ________ Scenario Number: 1 Event Number: 6

Event Description: ***Loss of Secondary Heat Sink Concurrent With ATWS (ACTIONS TAKEN FOR SI DURING THE PERFORMANCE OF FRP-S.1 PER SUPPLEMENT 'L')***

Time	Position	Applicant's Actions or Behaviors
	BOP	Verify CONTAINMENT ISOLATION PHASE A valves CLOSED
	BOP	Verify FW Isolation Valves CLOSED - FRVs - FRV Bypass Valves - V2-6A, FW HDR SECTION - V2-6B, FW HDR SECTION - V2-6C, FW HDR SECTION ***V2-6B and V2-6C no power to E-2 (MCC power).***
	BOP	Verify both FW Pumps TRIPPED
	BOP	While verifying AFW Pumps running, determines that NO AFW Pumps are running ***- AFW Pump 'A' under clearance*** ***- AFW Pump 'B' no power to E-2*** ***- SDAFW Pump trip***

Op-Test Number: ________ Scenario Number: 1 Event Number: 6

Event Description: ***Loss of Secondary Heat Sink Concurrent With ATWS (ACTIONS TAKEN FOR SI DURING THE PERFORMANCE OF FRP-S.1 PER SUPPLEMENT 'L')***

Time	Position	Applicant's Actions or Behaviors
	BOP	While verifying two SI pumps running, determines that only ONE SI Pump is running ***- SI Pump 'A' under clearance*** ***- SI Pump 'C' no power to E-2***
	BOP	While verifying two RHR pumps running, determines that only ONE RHR Pump is running ***- RHR Pump 'B' no power to E-2***
	BOP	While verifying proper SI alignment, determines only Train 'A' aligned ***- Train 'B' Valves no power to E-2 (MCC-6)***
	BOP	Check CCW Pumps at least one running
	BOP	Check SW header pressure being maintained between 40 and 50 psig

Op-Test Number: ________ Scenario Number: 1 Event Number: 6

Event Description: ***Loss of Secondary Heat Sink Concurrent With ATWS (ACTIONS TAKEN FOR SI DURING THE PERFORMANCE OF FRP-S.1 PER SUPPLEMENT 'L')***

Time	Position	Applicant's Actions or Behaviors
	BOP	While verifying two SWBPs running, determines that only ONE SWBP is running ***- SWBP 'B' no power to E-2 (MCC-18)***
	BOP	While verifying CV RECIRC FANS running, determines that only TWO CV RECIRC FANS running ***- HVH-3 no power to E-2*** ***- HVH-4 no power to E-2***
	BOP	Verify IVSW system INITIATED - IVSWS VA PCV-1922A - IVSWS VA PCV-1922B
	BOP	Verify CONTAINMENT VENTILATION ISOLATION is INITIATED
	BOP	Verify Control Room Ventilation shifted to Emergency Pressurization Mode - CONT RM AIR EXHAUST fan HVE-16 is STOPPED - CLEANING fan HVE-19A or B is RUNNING - CONTROL ROOM AIR EXHAUST FAN DISCHARGE DAMPER, CF-D1A-SA is CLOSED - CONTROL ROOM AIR EXHAUST FAN DISCHARGE DAMPER, CF-D1B-SB is CLOSED

Op-Test Number: ________ Scenario Number: 1 Event Number: 6

Event Description: ***Loss of Secondary Heat Sink Concurrent With ATWS (ACTIONS TAKEN FOR SI DURING THE PERFORMANCE OF FRP-S.1 PER SUPPLEMENT 'L')***

Time	Position	Applicant's Actions or Behaviors
	BOP	Verify both EDGs RUNNING ***NOTE: May note also that EDG 'B' is running without cooling flow and may inform SRO.***
	BOP	Check CV pressure has remained below 10 psig
	BOP	If Main Steam Line Isolation required, then verify all MSIVs and MSIV BYPs are CLOSED
	BOP	Direct operator to locally open breaker for AUX BUILDING SUPPLY FAN, HVS-1, at MCC-5 (7J)
		SIMULATOR OPERATOR INSTRUCTIONS: Insert MRF EPS214 RACK_OUT.
	BOP	Inform SRO that Supplement 'L' completed with noted discrepancies due to clearances, loss of Bus E-2, and equipment failures

Op-Test Number: ________ Scenario Number: 1 Event Number: 6

Event Description: ***Loss of Secondary Heat Sink Concurrent With ATWS (FRP-S.1 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	SRO	Check if the following trips have occurred: - Reactor Trip - Turbine Trip
	BOP	***CONTINUOUS ACTION*** If CST level decreases to less than 10%, then align SW to AFW Pump suction IAW OP-402, "Auxiliary Feedwater System"
	SRO	Determine that Main FW cannot be used to establish SG level due to break in FW Header
	RO	Isolate Primary Water Dilution path as follows: - Verify both Primary Water Pumps STOPPED - Verify FCV-114A, PW TO BLENDER, is CLOSED
	BOP	Determine NO UNCONTROLLED RCS Cooldown in progress: - RCS temperatures are NOT decreasing in an uncontrolled manner - SG pressures are NOT decreasing in an uncontrolled manner
	BOP	Stop any CONTROLLED RCS Cooldown

Op-Test Number: ________ Scenario Number: 1 Event Number: 6

Event Description: ***Loss of Secondary Heat Sink Concurrent With ATWS (FRP-S.1 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	BOP	Verify Battery Charger Alarms NOT illuminated - APP-036-D1, BATT CHARGER A/A1 TROUBLE - APP-036-D2, BATT CHARGER B/B1 TROUBLE
	RO	Check Core Exit T/Cs less than 1200 °F
	RO	Check Reactor subcritical as follows: - Power Range channels LESS THAN 5% - Intermediate Range channels - NEGATIVE STARTUP RATE
	RO	Check Emergency Boration performed or being performed using MOV-350 flowpath
	SRO	Notify Engineering to evaluate the following to determine if RCP Seal inspection is required: - RCP Bearing temperatures - No. 1 Seal Leakoff temperatures - No. 1 Seal Leakoff flowrates

Op-Test Number: ________ Scenario Number: 1 Event Number: 6

Event Description: ***Loss of Secondary Heat Sink Concurrent With ATWS (FRP-S.1 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	RO	***CONTINUOUS ACTION*** Check ARPI - LESS THAN TWO RODS STUCK OUT
	RO	Stop the boration - Close MOV-350 - Stop the running Boric Acid Transfer Pump
	RO	Reset SPDS
	SRO	Initiate monitoring of Critical Safety Function Status Trees
	SRO	Determine RED path for Secondary Heat Sink is highest priority CSFST

Op-Test Number: ________ Scenario Number: 1 Event Number: 6

Event Description: ***Loss of Secondary Heat Sink Concurrent With ATWS (FRP-H.1 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	SRO	Enters and directs the actions of FRP-H.1, "Response to Loss of Secondary Heat Sink"
	SRO	Determines that total feed flow LESS THAN 300 gpm is NOT due to operator action
	RO	***CONTINUOUS ACTION*** Determines a Secondary Heat Sink is required - RCS pressure GREATER THAN any non-faulted SG pressure - RCS temperature GREATER THAN 350 $^{\circ}$F
	BOP	***CONTINUOUS ACTION*** If two S/G wide range levels have decreased to less than 27%, then STOP all RCPs, and go to steps in FRP-H.1 for RCS feed and bleed **NOTE: REMAINING ACTIONS TO ESTABLISH AFW OR FEED FLOW ARE NOT INCLUDED IN SCENARIO SINCE CONDITIONS MAY BE ESTABLISHED AT THIS TIME TO INITIATE FEED AND BLEED. ADDITIONALLY, IT IS THE INTENT OF THE SCENARIO TO NOT ESTABLISH AFW FLOW.**

Op-Test Number: ______	Scenario Number: 1	Event Number: 6
Event Description: ***Loss of Secondary Heat Sink Concurrent With ATWS (FRP-H.1 ACTIONS)***		

Time	Position	Applicant's Actions or Behaviors
	RO	Initiate Safety Injection as follows: - Depress the INITIATE SAFETY INJECTION pushbutton - Note time initiated ***NOTE: Safety Injection will have automatically actuated earlier.***
	RO	Verify RCS Injection Path as follows: - Verify at least one SI Pump RUNNING - Verify SI valves for at least one flowpath aligned for Cold Leg Injection
	RO	***CONTINUOUS ACTION*** When 2 minutes have elapsed since SI initiated, then RESET: - Safety Injection - Containment Spray
	RO	Reset the following Containment Isolations: - Phase A - Phase B
	RO	Establish Instrument Air to CV as follows: - Verify APP-002-F7, INSTR AIR HDR LO PRESS, extinguished - Place IA PCV-1716, INSTRUMENT AIR ISO TO CV, to the OVERRIDE position

Op-Test Number:	________	Scenario Number:	1	Event Number:	6

Event Description: ***Loss of Secondary Heat Sink Concurrent With ATWS (FRP-H.1 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	RO	Establish RCS Bleed Path as follows: - Verify power to PZR PORV Block Valves only available to PCV-455C block ***- Both Blocks have no power to E-2 (MCC-6)*** - Place all PZR Heater Control switches to OFF position - Verify PZR PORV Block Valves both OPEN ***NOTE: No indication to either Block. Last known position was open.*** - Open both PORVs ***NOTE: May elect to NOT open PORVs due to no power to blocks. This is acceptable, particularly since scenario is designed to not allow PCV-456 to open anyway and requirement is to open vents.***
	RO	Determines an adequate RCS bleed path does NOT exist due to either choosing to NOT open PORVs OR due to the failure of PCV-456 to open
	RO	Places the Key Switches for the following Vent Valves to the OPEN position: - RC-568, HEAD VENT - RC-570, PZR VENT - RC-572, CV ATMOS - RC-567, HEAD VENT - RC-569, PZR VENT - RC-571, PRT ISO **CRITICAL TASK TO ESTABLISH FLOW THROUGH VENT VALVES TO ENSURE ADEQUATE RCS BLEED PATH.**

Op-Test Number: ________ Scenario Number: 1 Event Number: 6

Event Description: ***Loss of Secondary Heat Sink Concurrent With ATWS (FRP-H.1 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	BOP	Depressurize at least one intact S/G to atmospheric pressure using steam line PORVs
		TERMINATE THE SCENARIO WHEN AN RCS FEED AND BLEED HAS BEEN ESTABLISHED VIA THE HEAD VENTS AND AT LEAST ONE SG IS BEING DEPRESSURIZED TO ATMOSPHERIC PRESSURE.

Op-Test Number: ______ Scenario Number: 1 Event Number: 7

Event Description: ***Failure of Reactor to Trip from the Control Room (ATWS)***

Time	Position	Applicant's Actions or Behaviors
		ACTIONS FOR THIS EVENT ARE INCLUDED IN THE ACTIONS FOR EVENT 6.

Op-Test Number: ______ Scenario Number: 1 Event Number: 8

Event Description: ***Failure of PZR PORV (456) to Open During RCS Feed and Bleed***

Time	Position	Applicant's Actions or Behaviors
		ACTIONS FOR THIS EVENT ARE INCLUDED IN THE ACTIONS FOR EVENT 6.

Op-Test Number: ________ Scenario Number: 1 Event Number: 9

Event Description: ***Event Classification***

Time	Position	Applicant's Actions or Behaviors
	SRO	Classifies the event as a Site Area Emergency
		NOTES: ***1) Based on ATWS with failure of Reactor to trip from the Control Room OR a complete loss of FW capability for both Hot Shutdown and Cold Shutdown conditions.*** ***2) Classification of the event following the scenario is considered 20% of the Performance Rating for JPM SRO-A.4.***

Facility: **RNP** Scenario Number: **2** Op-Test Number: ______

Examiners	Operators
______	______
______	______
______	______

Objectives: To evaluate the candidates' ability to perform a plant startup at BOL. To evaluate the candidates' ability to respond to a controlling channel of SG level failure and a VCT level channel failure. To evaluate the candidates' response to trip of a service water pump and a failure of the letdown pressure controller. The candidates will be evaluated on their response to a SGTR. Post-trip response will be evaluated on the candidates' ability to address a failed open SG safety valve on the ruptured SG.

Initial Conditions: IC-202. 13% power BOL; Equipment out of service is CCW Pump 'A'.

Turnover: 13% power, BOL. Severe thunderstorms have been reported in the area. A 0.2 gpm tube leak exists in SG 'A'.

Equipment out-of-service is CCW Pump 'A' for breaker overhaul. Pump is expected to be returned to service within 8 hours.

RM-31B is out of service.

Boron concentration is 1420 ppm. Bank D rods are at 129 steps.

Shift orders are to continue the plant startup to 30% power. GP-005 has been completed through Step 8.4.29.

Event Number	Malfunction Number (1)	Event Type*	Event Description
1	NA	BOP(N) SRO(N)	Continued Plant Startup
		RO(R) SRO(R)	Control of Reactivity During Plant Startup
2	ICOR LT:476 0 0 Asls	BOP(I) SRO(I)	Controlling Channel of SG 'A' Level Failure Low

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor
(1) See Attachment, "Simulator Setup & Actions Required for Scenario," for details on setup.

Event Number	Malfunction Number	Event Type*	Event Description
3	ICOR LT:112 (NONE 0 0) 100 180 Asls	RO(I) SRO(I)	VCT Level Channel Failure High
4	IMF SWS01A	BOP(C) SRO(C)	Service Water Pump Trip
5	IMF CVC07 (NONE 0 0) 100 0 Asls	RO(C) SRO(C)	Letdown Pressure Control Valve Controller Failure
6	IMF SGN02E 35 0	RO(M) BOP(M) SRO(M)	Steam Generator 'B' Tube Rupture at 35 gpm
	IMF SGN02E 750 600		Steam Generator 'B' Tube Rupture ramping to 750 gpm
7	IMF SGN01F 80 60	BOP(C) SRO(C)	Failed Open SG Safety Valve on Ruptured SG 'B'
8	NA	SRO	Classify the Event

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor
(1) See Attachment, “Simulator Setup & Actions Required for Scenario,” for details on setup.

Simulator Setup & Actions Required for Scenario # 2

Event Number	Simulator Operator Actions	
INITIAL CONDITIONS	IC-202. 13% power BOL. Equipment out of service is CCW Pump 'A'. Equipment out of service is CCW Pump 'A'. RM-31B is also OOS. Insert a 0.2 gpm tube leak on SG 'A'.	
1	NA	Plant Power Increase and Control of Reactivity - **NO MALFUNCTIONS REQUIRED**
2	ICOR LT:476 0 0 Asls	Controlling Channel of SG 'A' Level Failure Low
3	ICOR LT:112 (NONE 0 0) 100 180 Asls	VCT Level Channel Failure High
4	IMF SWS01A	Service Water Pump Trip
5	IMF CVC07 (NONE 0 0) 100 0 Asls	Letdown Pressure Control Valve Controller Failure
6	IMF SGN02E 35 0	Steam Generator 'B' Tube Rupture at 35 gpm
	IMF SGN02E 750 600	Steam Generator 'B' Tube Rupture ramping to 750 gpm
7	IMF SGN01F 80 60	Failed Open SG Safety Valve on Ruptured SG 'B' - **INSERT UPON ISOLATION OF SG 'B'**
8	NA	Classify the Event - **NO MALFUNCTIONS REQUIRED**

SHIFT TURNOVER SCENARIO # 2

13% power, BOL. Severe thunderstorms have been reported in the area. A 0.2 gpm tube leak exists in SG 'A'.

Equipment out-of-service is CCW Pump 'A' for breaker overhaul. Pump is expected to be returned to service within 8 hours.

RM-31B is out of service.

Boron concentration is 1420 ppm. Bank D rods are at 129 steps.

Shift orders are to continue the plant startup to 30% power. GP-005 has been completed through Step 8.4.29.

Op-Test Number:	______	Scenario Number:	2	Event Number:	1

Event Description: ***Power Ramp with Control of Reactivity***

Time	Position	Applicant's Actions or Behaviors
	SRO	Directs the actions of GP-005, "Power Operation," commencing with Step 8.4.30
	BOP	***NOTE: The following two steps may be performed whenever plant conditions require Feedwater flow through the FRVs and conditions are suitable for automatic S/G water level control.*** ***Feedwater Regulating Valves should be transferred to automatic control one at a time.*** WHEN feedwater requirements increase up to the capacity of the Feedwater Regulating Bypass Valves, THEN shift feedwater flow control to the Feedwater Regulating Valves (FRVs) by throttling open the FRVs while throttling closed their respective Bypass Valves.
	BOP	WHEN Reactor Power is 15% to 20%, OR the Feedwater Regulating Bypass Valves are at 60% to 90% demand signal, THEN shift each Feedwater Regulating Valve to AUTO as follows: 1. Verify Feed Flow is trending with Steam Flow AND S/G Levels are trending to program level 2. Depress the AUTO pushbutton on the FRV controller, AND slowly close its respective Feedwater Regulating Bypass Valve 3. Verify each FRV in AUTO is maintaining programmed S/G level
	RO	Withdraw Control Rods, as necessary, to allow for the Power Ramp while maintaining Tavg within +0.5 to -2.5 °F of Tref

Op-Test Number: ______	Scenario Number: 2	Event Number: 1
Event Description: ***Power Ramp with Control of Reactivity***		

Time	Position	Applicant's Actions or Behaviors
	BOP	WHEN the selected TURBINE FIRST STAGE PRESS indicates greater than 50 psig, THEN perform the following: 1. Depress the HOLD pushbutton. 2. Match the REFERENCE and SETTER indication using the REF Δ and/or REF ∇ pushbuttons. 3. IF desired to increase load with IMP IN inservice, THEN perform the following: a. Depress the IMP IN pushbutton AND check that IMP IN is ILLUMINATED. b. Check the IMP OUT pushbutton is EXTINGUISHED. 4. Adjust the SETTER indication using the REF Δ and/or REF ∇ pushbuttons to indicate no greater than 20.0 load. 5. Depress the GO and/or HOLD pushbuttons AND the REF Δ and/or REF ∇ to continue the load increase to 20% Reactor Power.
	SRO	IF at anytime a load change of greater than or equal to 15% of RTP occurs in any 1 hour period, THEN request E&C to sample the RCS for Dose Equivalent I-131 specific activity within the next 2 to 6 hours to verify it is less than or equal to 1.0FCi/gm (ITS SR 3.4.16.2).
	RO	IF Reactor Power is greater than 15%, OR as directed by the Reactor Engineer, THEN verify proper operation of the CAOC program in ERFIS.
	BOP	***NOTE: Rod Control may be shifted to AUTO when Tavg is within 0.5° F of Tref and the AUTO ROD WITHDRAWAL BLOCK status light is extinguished.*** WHEN the highest indicator of Reactor Power listed on Attachment 10.1 indicates less than or equal to 20% power, THEN depress the HOLD pushbutton AND maintain indicated power.

Op-Test Number:	______	Scenario Number:	2	Event Number:	1
Event Description:	***Power Ramp with Control of Reactivity***				

Time	Position	Applicant's Actions or Behaviors
	RO	Record the data required on Attachment 10.1.
	SRO	IF all indications of Reactor Power do NOT agree within 5% of each other, THEN contact plant management for further instructions.
	BOP	Perform the following while maintaining 20% Reactor Power: 1. Verify the Turbine Lube Oil Cooler is maintaining the oil temperature leaving the bearings between 140°F and 160°F. 2. IF bearing oil temperature is outside the normal band of 140°F to 160°F, THEN monitor expected bearing oil return and metal temperatures IAW OP-506. 3. Close all Turbine drains: - DV-1, MAIN STEAM DRAIN - DV-2, MAIN STEAM DRAIN - DV-3, MAIN STEAM DRAIN - DV-4, MAIN STEAM DRAIN - DV-5, FIRST STAGE DRAIN - DV-6, MOISTURE SEPARATOR A DRAIN - DV-7, MOISTURE SEPARATOR B DRAIN

Op-Test Number: ________	Scenario Number: 2	Event Number: 2
Event Description: ***Steam Generator 'A' Level Transmitter (476) Failure Low***		

Time	Position	Applicant's Actions or Behaviors
		SIMULATOR OPERATOR INSTRUCTIONS: ENSURE FRVs HAVE BEEN PLACED IN AUTOMATIC PRIOR TO INSERTING THIS MALFUNCTION.
	BOP	Diagnoses low failure of Steam Generator 'A' Level Transmitter LT-476 - LI-476 decreasing - FR-478 blue pen decreasing - FCV-478 opening with demand increasing - APP-006-A1, SG A FW > STM FLOW, illuminated - APP-006-A3, SG A LVL DEV, illuminated - APP-006-D1, SG A NAR RANGE LO/LO-LO LEVEL, illuminated
	SRO	Enters and directs the actions of AOP-025, "RTGB Instrument Malfunction," Section D, "S/G Narrow Range Level Failure"
	BOP	***IMMEDIATE ACTION*** Place FRV 'A' (FCV-478) in MANUAL
	BOP	***IMMEDIATE ACTION*** Restore SG 'A' level to between 39% and 52%
	SRO	Direct the actions of OWP-027, SGL-3, "SG A Level Channel LT-476," to remove 476 from service

Op-Test Number: ______	Scenario Number: 2 Event Number: 2
Event Description:	***Steam Generator 'A' Level Transmitter (476) Failure Low***

Time	Position	Applicant's Actions or Behaviors
	SRO	***SELECTED PRECAUTION*** 1) Refer to ITS Table 3.3.1-1 Item 13 for RPS OPERAIBLITY requirements in MODES 1 and 2. Refer to ITS Table 3.3.3-1 Item 13 for PAM OPERABILITY requirements in MODES 1, 2, and 3. Refer to ITS Table 3.3.8-1 Item 1 for AFW instrumentation OPERABILITY requirements in MODES 1, 2, and 3.
	BOP	Perform the following RTGB switch alignment: - FCV-478 CONTROLLER in MANUAL
	SRO	Direct the tripping of the following bistable in the Hagan Racks - SG NO. 1 LO-LO LEVEL LC476A1
	SRO	Return to Main Body of procedure (AOP-025)
	SRO	Implement the EALs

Op-Test Number: ________ Scenario Number: 2 Event Number: 2

Event Description: ***Steam Generator 'A' Level Transmitter (476) Failure Low***

Time	Position	Applicant's Actions or Behaviors
	SRO	Refer to Technical Specifications - TS Table 3.3.1-1 Item 13, RPS Instrumentation (6 hours to trip bistables) - TS Table 3.3.3-1 Item 13, PAM Instrumentation (6 hours to Mode 3 if less than 2 channels) - TS Table 3.3.8-1 Item 1, AFW Instrumentation (6 hours to trip bistables)

Op-Test Number: ______	Scenario Number: 2 Event Number: 3
Event Description:	***VCT Level Transmitter (112) Failure High***

Time	Position	Applicant's Actions or Behaviors
	RO	Diagnoses high failure of VCT level transmitter LT-112 - VCT/HLDP TK DIV LCV-115A aligns to the Holdup Tank - LI-115 decreasing - Auto makeup occurs at 20 inches - APP-003-E3, VCT HI/LO LVL, illuminated when level decreases to 17 inches
	SRO	Enters and directs the actions of AOP-003, "Malfunction of Reactor Makeup Control"
	RO	Check for failure of a level transmitter as follows: - Obtain VCT level for LT-115 from ERFIS - Obtain VCT level for LT-112 from ERFIS - Check deviation between LT-112 and LT-115 greater than 8" (13%)
	RO	Check LT-115 NOT failed HIGH
	RO	Check LT-115 NOT failed LOW
	RO	Determine LT-112 failed HIGH

Op-Test Number: ________ Scenario Number: 2 Event Number: 3

Event Description: ***VCT Level Transmitter (112) Failure High***

Time	Position	Applicant's Actions or Behaviors
	RO	***CAUTION: With NO operator action, LT-112 failing high with makeup flow less than charging suction flow will result in a loss of Charging Pump suction.*** Stabilize the RCS Makeup System as follows: - Place LCV-115A, VCT / HLDP TK DIV, to VCT postion - Obtain Hagan Rack Key number 10 - Place the selector switch in the bottom of Hagan Rack 19 to LT-115 position - Check selector switch in Hagan Rack 19 selected to LT-115 - Place LCV-115A in AUTO position - Contact I&C to repair failed channel
		SIMULATOR OPERATOR INSTRUCTIONS: Place selector to LT-115 by inserting MRF CVC067 LT-115.
	RO	***CONTINUOUS ACTION*** If VCT level decreases to less than 12.5" (21%), then verify charging pump suction is aligned to the RWST
	RO	Check VCT level greater than 20" (33%)
	RO	Check VCT level less than 51.5" (86%)

Op-Test Number: ______	Scenario Number: 2	Event Number: 3
Event Description: ***VCT Level Transmitter (112) Failure High***		

Time	Position	Applicant's Actions or Behaviors
	RO	Verify Charging and Letdown flows are normal for plant conditions
	RO	Check APP-003-D5, BA FLOW DEV, extinguished
	RO	Check APP-003-E5, MAKEUP WATER DEV, extinguished
	RO	Check boration NOT required
	RO	Check dilution NOT required
	SRO	Check Technical Specifications for applicable LCO and determine no LCOs apply

Op-Test Number: ______ Scenario Number: 2 Event Number: 4

Event Description: ***Trip of Service Water Pump 'A'***

Time	Position	Applicant's Actions or Behaviors
	BOP	Diagnoses trip of Service Water Pump 'A' - SW Pump 'A' control switch red AND green lights illuminated - PI-1616 decreasing - PI-1684 decreasing - APP-008-F4, SW Pump A/B/C/D OVLD, illuminated - APP-008-E4/E5/E6, CW PUMP A/B/C SEAL WTR LOST, momentarily illuminated - APP-008-F7/F8, SOUTH/NORTH SW HDR LO PRESS, illuminated - APP-002-A8/B8/C8/D8, HVH-1/2/3/4 WTR OUTLET LO FLOW, illuminated
	SRO	Enters and directs the actions of APP-008-F4, SW PMP A/B/C/D OVLD
	BOP	START a Standby Service Water Pump
	BOP	Dispatch operator to check breaker AND Current Limiter Fuses for SW Pump 'A' at 480V Bus E-1
	BOP	Throttle CCW Heat Exchanger Return Valves, as necessary, to maintain 40 to 50 psig in the SW Headers.
	SRO	Refer to Technical Specifications 3.7.7, Service Water System (72 hour TS due to Train 'A' inoperable)

Op-Test Number: ________ Scenario Number: 2 Event Number: 5

Event Description: ***Letdown Pressure Control Valve Controller (PCV-145) Failure Closed***

Time	Position	Applicant's Actions or Behaviors
	RO	Diagnoses failure of PCV-145 to closed position - PI-145 increasing - PC-145 demand increasing to CLOSED - TI-141 (letdown temp) increasing - APP-001-D6, LP LTDN LN HI PRESS, illuminated - APP-001-E6, LP LTDN RELIEF HI TEMP, illuminated - APP-003-C3, PRT HI PRESS, illuminated - APP-003-E6, PZR PORV LN HI TEMP, illuminated - APP-003-F6, PZR SAFETY VLV LINE HI TEMP, illuminated
	SRO	Enters and directs the actions of APP-001-D6, LP LTDN LN HI PRESS ***NOTE: Responding to APP-001-E6 will direct performance of actions APP-001-D6 if both are illuminated. May also elect to enter AOP-025, "RTGB Instrument Malfunctions," which is acceptable since same actions will be taken.***
	RO	Attempts to take manual control of PCV-145, but determines no response
	RO	IF PCV-145 failed, THEN remove Letdown from service using OP-301, "Chemical and Volume Control System" (Section 8.3.1)

Op-Test Number: ________ Scenario Number: 2 Event Number: 5

Event Description: ***Letdown Pressure Control Valve Controller (PCV-145) Failure Closed***

Time	Position	Applicant's Actions or Behaviors
	RO	IF necessary to Isolate Letdown, THEN perform the following: a. CLOSE LCV-460A and LCV-460B, Letdown Line Stop Valves b. CLOSE CVC-200A, LETDOWN ORIFICE ISOLATION c. CLOSE CVC-200B, LETDOWN ORIFICE ISOLATION d. CLOSE CVC-200C, LETDOWN ORIFICE ISOLATION e. CLOSE CVC-204A and CVC-204B, Letdown Line Isolation Valves **CRITICAL TASK TO ISOLATE LETDOWN TO PREVENT LOSS OF COOLANT THROUGH RELIEF VALVE.**
	RO	IF Letdown is required AND PCV-145 failed, THEN place Excess Letdown in service using OP-301-1, "Chemical and Volume Control System (Infrequent Operation)" (Section 8.4.12)
	RO	IF available, THEN perform the following: 1) Place on ERFIS trend Charging Header Pressure (CHP0142A) and RCS Charging Flow (CHF0128A) 2) Update the ERFIS Calorimetric program to reflect Excess Letdown is in service.
	RO	Verify OPEN CC-739, CCW FROM EXCESS LTDN HX.
	RO	Verify Component Cooling Water flow is greater than or equal to 240 gpm as indicated by FI-624.

Op-Test Number: ______ Scenario Number: 2 Event Number: 5

Event Description: ***Letdown Pressure Control Valve Controller (PCV-145) Failure Closed***

Time	Position	Applicant's Actions or Behaviors
	RO	***NOTE: Additional excess letdown flow may be obtained by placing CVC-389, EXCESS LTDN DIV, to the RCDT position, however considerations should be given to the additional liquid waste generated.*** Position CVC-389, EXCESS LTDN DIV, as required by plant conditions.
	RO	***CAUTION: Excess Letdown HX outlet temperature shall NOT exceed 195° F*** Using HIC-137 positioner slowly open HCV-137, EXCESS LTDN FLOW, allowing for warmup of the Excess Letdown Heat Exchanger.
	RO	Verify HIC-121, CHARGING FLOW FULL OPEN.
	RO	***NOTE: Pressurizer Level will increase if total charging flow exceeds total letdown flow AND Reactor Coolant Pump seal leakoff flow.*** IF normal letdown will be removed from service, THEN perform the following: - Verify one Charging Pump RUNNING - Place the Charging Pump in MANUAL AND REDUCE speed to minimum ***NOTE: Letdown was previously isolated due to lifting the letdown line relief.***

Op-Test Number: ______	Scenario Number: 2 Event Number: 5
Event Description:	***Letdown Pressure Control Valve Controller (PCV-145) Failure Closed***

Time	Position	Applicant's Actions or Behaviors
	RO	Record the following charging line and RCP seal injection flows. - FT-122 RCS CHARGING FLOW from ERFIS CHF0128A - FI-124 - FI-127 - FI-130 - Add the flows recorded above for the TOTAL Charging Pump flow
		CUE: WHEN LOCAL SEAL INJECTION FLOWS ARE REQUESTED, PROVIDE VALUES USING INSTRUCTOR SCREEN INDICATIONS.
	RO	***NOTE: It is NOT necessary to readjust RCP Seal Injection Flows to the normal range of 8 to 13 gpm for evolutions which will only last for several hours, provided the seal injection flow is maintained within 6 to 20 gpm for RCP Continuous operation. Seal injection flow shall be ≥ 6 gpm to each RCP when in MODES 1, 2, 3 and 4. (TS 3.4.17)*** ***CAUTION: IF care is NOT exercised WHEN throttling closed on HIC-121 OR CVC-297A, B, or C, the Charging Pump discharge pressure may increase AND result in lifting the Charging Pump discharge relief valve(s) which may not reseat. Maintaining a flow path greater than the charging pump(s) capacity will prevent the discharge relief valve(s) from being challenged.*** IF Charging flow is changed, THEN while maintaining Charging Pump discharge pressure less than 2500 psig, throttle the following valves, as necessary, to establish Seal Injection flow to an acceptable range: - CVC-297A, RCP "A" SEAL WATER FLOW CONTROL VALVE - CVC-297B, RCP "B" SEAL WATER FLOW CONTROL VALVE - CVC-297C, RCP "C" SEAL WATER FLOW CONTROL VALVE

Op-Test Number: ______	Scenario Number: 2	Event Number: 5		

Event Description: ***Letdown Pressure Control Valve Controller (PCV-145) Failure Closed***

Time	Position	Applicant's Actions or Behaviors
	RO	IF seal injection flow cannot be increased to an acceptable range, THEN, while MAINTAINING Charging Pump discharge PRESSURE LESS THAN 2500 psig AND TOTAL CHARGING PUMP FLOW GREATER THAN OR EQUAL to the value recorded previously, perform the following: 1) Throttle close HIC-121 to obtain acceptable seal injection flows. 2) Throttle the following valves, as necessary, to establish Seal Injection flow to an acceptable range: - CVC-297A, RCP "A" SEAL WATER FLOW CONTROL VALVE - CVC-297B, RCP "B" SEAL WATER FLOW CONTROL VALVE - CVC-297C, RCP "C" SEAL WATER FLOW CONTROL VALVE
	SRO	IF Pressurizer level continues increasing, THEN contact Chemistry to perform the alignment for purging the Pressurizer Liquid sample line with full flow to the VCT IAW CP-003.
	SRO	IF Pressurizer level continues to increase, THEN evaluate the time excess letdown will be required against the rate of Pressurizer level increase and length of time available to remain with excess letdown in service.
	SRO	Refers to TS 3.4.9, Pressurizer, and 3.4.17, Chemical and Volume Control System

Op-Test Number: ________ Scenario Number: 2 Event Number: 6

Event Description: ***Rupture / Faulted Steam Generator 'B' (AOP-035 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	BOP	Diagnoses 35 gpm tube leak on Steam Generator 'B' - R-15 (condenser air removal) increasing - RR1, Channel 17 (R-15), illuminated - Charging flow increasing - PZR level decreasing - VCT level decreasing - APP-036-D8, PROCESS MONITOR HI RAD, illuminated
	SRO	Enters and directs the actions of AOP-035, "Steam Generator Tube Leak" ***NOTE: May concurrently perform the actions of AOP-005, "Radiation Monitoring."***
	RO	Check RCS level decreasing in an uncontrolled manner
	SRO	***CONTINUOUS ACTION*** If PZR level CANNOT be maintained greater than 10% or RCS subcooling CANNOT be maintained greater than 35 °F, then direct a Reactor Trip and go to PATH-1
	RO	***NOTE: Use of the RWST will add negative reactivity.*** ***CONTINUOUS ACTION*** If VCT level decreases to less than 12.5 inches, then align Charging Pump Suction from the RWST as follows: - Verify LCV-115B, EMERG MU TO CHG SUCT, is OPEN - Verify LCV-115C, VCT OUTLET, is CLOSED

Op-Test Number: ________ Scenario Number: 2 Event Number: 6

Event Description: ***Rupture / Faulted Steam Generator 'B' (AOP-035 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	RO	Place running Charging Pump Speed Controller in MAN and adjust output to maximum
	RO	Check RCS level decreasing in an uncontrolled manner ***NOTE: Depending on status of charging pumps and excess letdown, uncontrolled level decrease may not occur until SGTR size is increased.***
	RO	Adjust Charging Flow as follows: - If only one Charging Pump is running, start an additional Charging Pump - Place running Charging Pump Speed Controllers in MAN and adjust output to maximum
	RO	Check RCS level decreasing in an uncontrolled manner
	RO	Check letdown in service
	RO	Verify all Letdown flowpaths isolated as follows: - CVC-460 A&B, LTDN LINE STOP valves CLOSED - HIC-137, EXCESS LTDN FLOW controller ADJUSTED TO 0% - CVC-387, EXCESS LTDN STOP valve CLOSED

Op-Test Number: ________ Scenario Number: 2 Event Number: 6

Event Description: ***Rupture / Faulted Steam Generator 'B' (PATH-1 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	RO	Establish maximum available Charging Flow as follows: - Verify all available Charging Pumps running - Place running Charging Pump Speed Controllers in MAN and adjust output to maximum while maintaining Charging Pump Discharge pressure less than 2500 psig - Observe maximum charging flow on FI-122A
	RO	Check RCS level decreasing in an uncontrolled manner
	SRO	Direct a Reactor Trip and go to PATH-1
	SRO	Enters and directs the actions of PATH-1
	RO	***IMMEDIATE ACTION*** Verify Reactor Trip
	BOP	***IMMEDIATE ACTION*** Verify Turbine Trip

Op-Test Number: ________ Scenario Number: 2 Event Number: 6

Event Description: ***Rupture / Faulted Steam Generator 'B' (PATH-1 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	BOP	***IMMEDIATE ACTION*** Verify E-1 and E-2 Energized
	RO	***IMMEDIATE ACTION*** Verify SI Initiated or manually initiate SI
	SRO	Open Foldout 'A'
	BOP	***FOLDOUT ITEM*** <u>MSR ISOLATION CRITERIA</u> IF ANY Purge OR Shutoff Valve does not indicate fully closed, THEN place the associated RTGB Switch to CLOSE
	RO	Verify Phase A Isolation valves CLOSED ***FOLDOUT ITEM*** <u>EXCESS LETDOWN ISOLATION CRITERIA</u> IF a Phase A Isolation signals occurs, THEN verify: - CVC-387, EXCESS LTDN STOP - CLOSED - HIC-137, EXCESS LTDN FLOW - CONTROLLER AT 0%
	BOP	Verify FW Isolation valves CLOSED

Op-Test Number: ______ Scenario Number: 2 Event Number: 6

Event Description: ***Rupture / Faulted Steam Generator 'B' (PATH-1 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	BOP	Verify both FW Pumps TRIPPED
	BOP	Verify both MDAFW Pumps RUNNING
	BOP	If additional feedwater is required, then start the SDAFW Pump
	RO	Verify two SI Pumps RUNNING
	RO	Verify both RHR Pumps RUNNING
	RO	Verify SI valves properly aligned

Op-Test Number: ________ Scenario Number: 2 Event Number: 6

Event Description: ***Rupture / Faulted Steam Generator 'B' (PATH-1 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	RO	Verify at least one CCW Pump RUNNING
	BOP	Determines SW Pump 'A' is NOT running due to previously tripping
	BOP	If North or South SW Header Low Press alarms illuminated, then CLOSE V6-16C OR V6-16A and V6-16B
	RO	Verify CV Fans HVH-1, HVH-2, HVH-3, and HVH-4 RUNNING
	BOP	Verify ISVW System INITIATED
	BOP	Verify Control Room Ventilation aligned for Pressurization Mode

Op-Test Number: ______	Scenario Number: 2	Event Number: 6
Event Description: ***Rupture / Faulted Steam Generator 'B' (PATH-1 ACTIONS)***		

Time	Position	Applicant's Actions or Behaviors
	BOP	Verify both EDGs RUNNING
	BOP	***CONTINUOUS ACTION*** Restart Battery Chargers within 30 minutes of power loss using OP-601, "DC Supply System"
	RO	***CONTINUOUS ACTION*** If CV pressure exceeds 10 psig, then perform the following: - Verify CV Spray initiated - Verify all CV Spray Pumps RUNNING with valves properly aligned - Verify approximately 12 gpm Spray Additive Tank flow - Verify Phase B Isolation valves CLOSED - STOP all RCPs
	BOP	If automatic Steam Line Isolation required, then verify all MSIVs and MSIV Bypasses CLOSED
	SRO	Direct an operator to locally open breaker for HVS-1, AUX BUILDING SUPPLY FAN, at MCC-5 (7J) within 60 minutes of SI initiation
		SIMULATOR OPERATOR INSTRUCTIONS: Insert MRF EPS214 to RACK_OUT.

Op-Test Number: ______	Scenario Number: 2 Event Number: 6
Event Description:	***Rupture / Faulted Steam Generator 'B' (PATH-1 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	RO	If RCS pressure is LESS THAN 1350 psig, then verify SI flow or align SI valves as necessary
	RO	If RCS pressure is LESS THAN 125 psig, then verify RHR flow or align RHR valves as necessary
	BOP	Verify at least 300 gpm AFW flow available or level in at least one SG greater than 8%
	BOP	Verify AFW valves properly aligned
	BOP	Control AFW flow to maintain SG levels between 8% and 50% ***NOTE: May isolate AFW flow to SG 'B' if level is above 8% due to SGTR.***
	RO	If RCP Thermal Barrier Cooling Water High OR Low Flow alarms are illuminated, then verify at least one Charging Pump running

Op-Test Number: ________ Scenario Number: 2 Event Number: 6

Event Description: ***Rupture / Faulted Steam Generator 'B' (PATH-1 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	BOP	Place Steam Dump Mode Selector Switch to STEAM PRESS mode
	BOP	If RCS temperature is LESS THAN 547 °F, then perform the following: - Attempt to limit the cooldown - If RCS cooldown continues and is NOT due to SI flow, then CLOSE the MSIVs and MSIV Bypasses
	BOP	If RCS temperature is greater than 547°F and NOT trending to 547°F, then dump steam using Condenser Dumps or Steam Line PORVs to attain 547°F
	RO	Verify proper operation of PZR PORVs and Spray
	RO	If RCS subcooling if less than 35°F AND at least one SI pump is running, then STOP all RCPs
	SRO	If any SG is completely depressurized or depressurizing in an uncontrolled manner, then Reset SPDS, initiate monitoring of CSFSTs, and go to EPP-11, "Faulted SG Isolation"

Op-Test Number: ________ Scenario Number: 2 Event Number: 6

Event Description: ***Rupture / Faulted Steam Generator 'B' (PATH-2 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	BOP	Determine high radiation levels exist or have existed on the following radiation monitors: - R-15, Condenser Air Ejector Gas - R-19B, SG Blowdown SG 'B' - R-31B, Steamline 'B' Monitor ***NOTE: All of these monitors are likely to be decreasing, but if abnormal levels no longer exist, it is expected that they will still be considered abnormal due to previous indications.***
	SRO	Transition to and direct the actions of PATH-2 (Entry Point J)
	RO	Reset SPDS
	SRO	Initiate monitoring of CSFSTs
	SRO	Open Foldout C

Op-Test Number: ______	Scenario Number: 2	Event Number: 6		
Event Description: ***Rupture / Faulted Steam Generator 'B' (PATH-2 ACTIONS)***				

Time	Position	Applicant's Actions or Behaviors
	RO	***FOLDOUT ITEM*** IF BOTH conditions below are met prior to commencing cooldown to required CET temperature, THEN stop all RCPs: - SI Pumps - AT LEAST ONE RUNNING AND CAPABLE OF DELIVERING FLOW TO THE CORE - RCS Subcooling - LESS THAN 35 ^{o}F
	BOP	***FOLDOUT ITEM*** IF EITHER condition below occurs, THEN Go To EPP-11, Faulted Steam Generator Isolation, unless the faulted S/G is already isolated: - Any S/G pressure is decreasing in an uncontrolled manner - Any S/G has completely depressurized
	RO	***CONTINUOUS ACTION*** When below 10^{-10} amps, than energize SR Detectors and transfer recorder
	SRO	Request periodic activity sample of all SGs
	BOP	Verify Steam Dump Mode Selector Switch in STEAM PRESS mode

Op-Test Number: ______	Scenario Number: 2	Event Number: 6		

Event Description: ***Rupture / Faulted Steam Generator 'B' (PATH-2 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	BOP	Open QCV-10426 to bypass Condensate Polishers
	RO	If RCS subcooling if less than 35°F AND at least one SI pump is running, then STOP all RCPs
	SRO	Identify SG 'B' as the ruptured SG
	BOP	Maintain at least one SG available for RCS cooldown
	BOP	Verify SG 'B' Steam Line PORV setpoint at 1035 psig using status board
	BOP	Verify RCS temperature less than 547°F and close SG 'B' MSIV and MSIV Bypass

Op-Test Number: ______ Scenario Number: 2 Event Number: 6

Event Description: ***Rupture / Faulted Steam Generator 'B' (PATH-2 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
		SIMULATOR OPERATOR INSTRUCTIONS: APPROXIMATELY ONE MINUTE AFTER MSIV IS CLOSED ON SG 'B', FAIL OPEN SG SAFETY VALVE BY INSERTING MFI SGN01F.
	BOP	***CONTINUOUS ACTION*** When SG 'B' pressure decreases below 1035 psig, then verify Steam Line 'B' PORV closed
	BOP	Close SG 'B' Steam Supply to SDAFW Pump
	BOP	Verify SG Blowdown Isolation and Sample valves closed
	SRO	Direct operator to locally close warmup steam supply from SG 'B' to SDAFW Pump
		SIMULATOR OPERATOR INSTRUCTIONS: Insert MRF MSS048 to 0.
	SRO	Direct operator to locally close SG 'B' MSIV above and below seat drains
		CUE: (Valves are normally closed) Inform CR that valves have been verified closed.

Op-Test Number: ________ Scenario Number: 2 Event Number: 6

Event Description: ***Rupture / Faulted Steam Generator 'B' (PATH-2 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	BOP	Isolate feed flow to SG 'B' due to being ruptured and faulted
	BOP	***CONTINUOUS ACTION*** If not previously isolated, then isolate feed flow to SG 'B' when level is above 8%
	SRO	***CONTINUOUS ACTION*** Direct operator to locally open the following breakers after feed flow is isolated to SG 'B': - V1-8B - V2-14B - V2-16B
		SIMULATOR OPERATOR INSTRUCTIONS: Insert MRF EPS226 to RACK_OUT (V1-8B), MRF EPS254 to RACK_OUT (V2-14B), and MRF EPS266 to RACK_OUT (V2-16B).
	BOP	Control feed flow to maintain intact SG levels between 8% and 50%
	BOP	Verify NO other SGs with uncontrolled level increase

Op-Test Number: ______ Scenario Number: 2 Event Number: 6

Event Description: ***Rupture / Faulted Steam Generator 'B' (PATH-2 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	RO	Verify proper operation of PZR PORVs
	RO	Reset SI
	RO / BOP	***CONTINUOUS ACTION*** If offsite power is lost, then restart ESF equipment
	RO	Reset Containment Spray
	RO	Reset Phase A and Phase B
	BOP	Establish IA to Containment

Op-Test Number: ________ Scenario Number: 2 Event Number: 6

Event Description: ***Rupture / Faulted Steam Generator 'B' (PATH-2 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	BOP	Verify all AC buses energized by offsite power
	RO	If RCS pressure is greater than 275 psig, then STOP both RHR pumps
	RO	***CONTINUOUS ACTION*** If RCS pressure decreases below 275 psig, then RESTART both RHR pumps
	BOP	Verify SG 'B' isolated ***NOTE: Although it may be noted that SG 'B' has developed a steam break subsequent to isolating per PATH-2, this decision must be answered 'YES' to allow continuation in PATH-2 so that the proper transition to EPP-17 can be made (See OMM-022, Section 8.3.7 for further discussion on Continuous Loops).***

Op-Test Number: ________ Scenario Number: 2 Event Number: 6

Event Description: ***Rupture / Faulted Steam Generator 'B' (EPP-17 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	SRO	If SG 'B' pressure is NOT greater than 220 psig, then go to EPP-17, "SGTR With Loss of Reactor Coolant: Subcooled Recovery" ***NOTE: Depending on several factors, including when AFW was isolated to SG 'B' and the pace which the crew has taken through PATH-1 and PATH-2, SG 'B' pressure may still be above 220 psig. If this is the case and the crew makes a determination to continue in PATH-2, they will be directed to transition to EPP-17 upon checking SG pressure after the completion of the RCS cooldown. This scenario is written assuming the decision to transition to EPP-17 is made before the cooldown is performed. Either flowpath is acceptable, provided EPP-17 is implemented.***
	SRO	Transitions to and directs the actions of EPP-17 **CRITICAL TASK TO TRANSITION TO EPP-17 TO MINIMIZE RADIOLOGICAL RELEASES TO THE ENVIRONMENT.**
	SRO	Open Foldout E
	RO	Reset SI

Op-Test Number:	Scenario Number: 2	Event Number: 6
Event Description: ***Rupture / Faulted Steam Generator 'B' (EPP-17 ACTIONS)***		

Time	Position	Applicant's Actions or Behaviors
	RO	Reset Containment Isolation Phase A and Phase B
	SRO	***CONTINUOUS ACTION*** If offsite power is lost, then return to Step 5 of EPP-17 to restart components
	BOP	***CONTINUOUS ACTION*** Establish IA to CV as follows: - Check APP-002-F7, INSTR AIR HDR LO PRESS, extinguished - Momentarily place IA PCV-1716 to RESET, then place in OPEN
	RO	Determine that NO CV Spray Pumps are running
	BOP	***CONTINUOUS ACTION*** Verify SG 'B' ruptured and faulted and isolate feed flow to SG 'B'
	RO	***CONTINUOUS ACTION*** If RCS pressure is greater than 275 psig, then STOP both RHR pumps

Op-Test Number: ________ Scenario Number: 2 Event Number: 6

Event Description: ***Rupture / Faulted Steam Generator 'B' (EPP-17 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	RO	***CONTINUOUS ACTION*** If RCS pressure decreases below 275 psig, then RESTART both RHR pumps
	SRO	Initiate evaluation of plant status - Verify Aux Bldg radiation monitors normal - Contact chemistry for RCS and SG sampling - Contact Operations Staff for additional actions
	RO	Establish Charging flow as follows: - Verify Charging Pump suction aligned to the RWST - Start all available Charging Pumps - Increase running Charging Pumps speed to maximum - Verify maximum charging flow on FI-122A
	BOP	Verify SG 'B' is isolated ***NOTE: Even though the safety valve on SG 'B' is open, implementation of Supplement 'G' will NOT address this.***
	BOP	Control intact SG levels between 8% and 50%

Op-Test Number: ________ Scenario Number: 2 Event Number: 6

Event Description: ***Rupture / Faulted Steam Generator 'B' (EPP-17 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	SRO	***CONTINUOUS ACTION*** When RCS boron samples are available, then ensure RCS is borated to Cold Shutdown conditions or borate to Cold Shutdown IAW OP-301, "Chemical and Volume Control System," or by providing suction to the Charging Pumps from the RWST
	BOP	***CONTINUOUS ACTION*** Initiate RCS Cooldown to Cold Shutdown as follows: - Maintain cooldown rate in RCS cold legs less than 100°F in last 60 mins - Maintain RCS temperature and pressure within limits of Curve 3.4 - Dump steam to condenser using 2 intact SGs
	BOP	When RCS temperature is less than 543°F, then perform the following: - Momentarily place STEAM DUMP CONTROL to BYPASS T-AVG INTLK - Check APP-006-F5, STEAM DUMP ARMED, illuminated - Continue RCS cooldown using steam dump to condenser
		TERMINATE THE SCENARIO WHEN AN RCS COOLDOWN HAS BEEN ESTABLISHED IN EPP-17 USING THE COOLDOWN STEAM DUMP VALVES.

Op-Test Number: ________ Scenario Number: 2 Event Number: 7

Event Description: ***Failed Open Safety Valve on Ruptured Steam Generator***

Time	Position	Applicant's Actions or Behaviors
		ACTIONS FOR THIS EVENT ARE INCLUDED IN THE ACTIONS FOR EVENT 6.

Op-Test Number: ________ Scenario Number: 2 Event Number: 8

Event Description: ***Event Classification***

Time	Position	Applicant's Actions or Behaviors
	SRO	Classifies the event as a Site Area Emergency
		NOTES: ***1) Based on Ruptured SG having a stuck open Safety Valve.*** ***2) Classification of the event following the scenario is considered 20% of the Performance Rating for JPM SRO-A.4.***

Facility: **RNP** Scenario Number: **3 (Spare)** Op-Test Number: ______

Examiners: ______ ______ ______

Operators: ______ ______ ______

Objectives: To evaluate the candidates' ability to raise power and control reactivity. To evaluate the candidates' ability to respond to a condensate pump trip, requiring a power reduction. To evaluate the candidates' ability to respond to a failure of a controlling channel of pressurizer level, a SG level channel failure, and unwarranted control rod motion. To evaluate the candidates' response to a steamline break inside containment. Post-trip complications will include a failure of both trains of Phase 'B' to actuate and a failure of the MSIVs to automatically close.

Initial Conditions: IC-214; 50% power EOL; Equipment OOS is RHR Pump 'A'.

Turnover: Power is 50% at EOL. Severe thunderstorms have been reported in the area. A 0.2 gpm tube leak exists in SG 'A'.

RHR Pump 'A' was taken out of service 2 hours ago for oil replacement due to contaminants and is expected to be returned to service within the next 2 hours. Technical Specification 3.5.2 has been entered and 70 hours remain before a plant shutdown is required.

RM-31B is out of service.

Boron concentration is 269 ppm. Bank D rods are at 171 steps.

Shift orders are to continue raising power and restore RHR Pump 'A' to service when it becomes available. GP-005, Step 8.5.14, has been completed.

Event Number	Malfunction Number (1)	Event Type*	Event Description
1	NA	BOP(N) SRO(N)	Continued Power Increase
		RO(R) SRO(R)	Control of Reactivity During Power Increase
2	IMF CFW09A	BOP(C) SRO(C)	Condensate Pump Trip and Power Reduction
	NA	RO(R) SRO(R)	Control of Reactivity During Power Reduction

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor
(1) See Attachment, "Simulator Setup & Actions Required for Scenario," for details on setup.

Event Number	Malfunction Number	Event Type*	Event Description
3	ICOR LT:459 100 0 Asls	RO(I) SRO(I)	Controlling Channel of Pressurizer Level Failure High
4	ICOR CFW FT:487 0 0 Asls	BOP(I) SRO(I)	Controlling Channel of Feed Flow Failure Low on SG 'B'
5	IMF CRF08	RO(C) SRO(C)	Unwarranted Automatic Rod Motion (Tref Input Failed Low)
6	IMF MSS01B 8e+06 30 Asls	RO(M) BOP(M) SRO(M)	Steam Line Break Inside Containment on SG 'B'
	IMF MS261B AS IS		Main Steam Isolation Check Valve Sticks Open on Main Steam Line 'B'
	IMF MSS03A 2 IMF MSS03B 2 IMF MSS03C 2	BOP(C) SRO(C)	Main Steam Isolation Valves Fail to Automatically Close
7	IMF CNM05A 3 IMF CNM05B 3 IMF CNM05C 3 IMF CNM05D 3 IMF CNM05E 3 IMF CNM05F 3	RO(C) SRO(C)	Phase 'B' Containment Isolation Fails to Automatically Actuate
8	NA		Classify the Event

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor
(1) See Attachment, "Simulator Setup & Actions Required for Scenario," for details on setup.

Simulator Setup & Actions Required for Scenario # 3 (Spare)

Event Number	Simulator Operator Actions	
INITIAL CONDITIONS	IC-214; 50% power EOL. Equipment OOS is RHR Pump 'A'. RM-31B is also OOS. Insert a 0.2 gpm tube leak on SG 'A'. Event 6 (MSIV failure AND MSIV check valve failure only) inserted prior to start of scenario. Event 7 inserted prior to start of scenario.	
1	NA	Plant Power Increase and Control of Reactivity - **NO MALFUNCTIONS REQUIRED**
2	IMF CFW09A	Condensate Pump Trip and Power Reduction and Control of Reactivity
3	ICOR LT:459 100 0 Asls	Controlling Channel of Pressurizer Level Failure High
4	ICOR CFW FT:487 0 0 Asls	Controlling Channel of Feed Flow Failure Low on SG 'B'
5	IMF CRF08	Unwarranted Automatic Rod Motion (Tref Input Failed Low)
6	IMF MSS01B 8e+06 30 Asls	Steam Line Break Inside Containment on SG 'B'
	IMF MS261B AS IS	Main Steam Isolation Check Valve on Main Steam Line 'B' Sticks Open - **INSERTED PRIOR TO START OF SCENARIO**
	IMF MSS03A 2 IMF MSS03B 2 IMF MSS03C 2	Main Steam Isolation Valves Fail to Automatically Close - **INSERTED PRIOR TO START OF SCENARIO**
7	IMF CNM05A 3 IMF CNM05B 3 IMF CNM05C 3 IMF CNM05D 3 IMF CNM05E 3 IMF CNM05F 3	Phase 'B' Containment Isolation Fails to Automatically Actuate - **INSERTED PRIOR TO START OF SCENARIO**
8	NA	Classify the Event - **NO MALFUNCTIONS REQUIRED**

SHIFT TURNOVER SCENARIO # 3 (Spare)

Power is 50% at EOL. Severe thunderstorms have been reported in the area. A 0.2 gpm tube leak exists in SG 'A'.

RHR Pump 'A' was taken out of service 2 hours ago for oil replacement due to contaminants and is expected to be returned to service within the next 2 hours. Technical Specification 3.5.2 has been entered and 70 hours remain before a plant shutdown is required.

RM-31B is out of service.

Boron concentration is 269 ppm. Bank D rods are at 171 steps.

Shift orders are to continue raising power and restore RHR Pump 'A' to service when it becomes available. GP-005, Step 8.5.14, has been completed.

Op-Test Number: ________	Scenario Number: 3 (Spare)	Event Number: 1
Event Description: ***Power Ramp with Control of Reactivity***		

Time	Position	Applicant's Actions or Behaviors
	SRO	Directs the actions of GP-005, "Power Operation," commencing with Step 8.5.15
	BOP	IF all indications of Reactor Power agree within 5% of each other, OR management approval has been obtained, THEN perform the following: 1. Adjust the SETTER indication using the REF Δ and/or REF ∇ pushbuttons to indicate no greater than 60.0 load. 2. Depress the GO and/or HOLD pushbuttons AND the REF Δ and/or REF ∇ as necessary to continue the load increase to 60% Reactor Power.
	BOP	***NOTE: APP-005-F3, PR UPPER CH HI FLUX DEV/AUTO DEFEAT and APP-005-F4, PR LOWER CH HI FLUX DEV/AUTO DEFEAT should extinguish when Reactor Power exceeds 50%.*** ***Starting a Main Feedwater Pump may cause the Security UPS inverter to trip.*** WHEN Reactor Power between 55% and 60%, THEN perform the following: 1. Notify Security AND I&C that starting a Main Feedwater Pump may cause the Security UPS inverter to trip 2. Start the second Main Feedwater Pump.
	RO	Withdraw Control Rods, as necessary, to allow for the Power Ramp while maintaining Tavg within +0.5 to -2.5 °F of Tref

Op-Test Number: ________	Scenario Number: 3 (Spare)	Event Number: 1		
Event Description:	***Power Ramp with Control of Reactivity (DILUTION)***			

Time	Position	Applicant's Actions or Behaviors
	RO	Dilute per OP-301, "Chemical and Volume Control System," as necessary, to allow for the Power Ramp while maintaining Tavg within +0.5 to -2.5 oF of Tref
	RO	Place the RCS MAKEUP MODE selector switch in DILUTE.
	RO	IF desired, THEN place controller FCV-114A, PRIMARY WTR FLOW DILUTE MODE, in MAN AND adjust the Controller as follows: 1) Using the UP/DOWN arrow pushbuttons, adjust FCV-114A Controller output to 30-50%.
	RO	Set the PRIMARY WTR TOTALIZER, YIC-114, to the desired quantity as follows: 1) Depress BUTTON "A". 2) Depress "CLR" BUTTON. 3) Key in the desired quantity AND depress the "ENT" BUTTON.
	RO	***NOTE: The following step will open FCV-114A, PW TO BLENDER, and FCV-114B, BLENDED MU TO VCT, and will start a Primary Water Pump.*** Place RCS MAKEUP SYSTEM switch in START.

Op-Test Number: ________	Scenario Number: 3 (Spare)	Event Number: 1
Event Description: ***Power Ramp with Control of Reactivity (DILUTION)***		

Time	Position	Applicant's Actions or Behaviors
	RO	IF desired, THEN manually adjust controller FCV-114A, PRIMARY WTR FLOW DILUTE MODE, using the UP and DOWN arrow pushbuttons to establish the desired Primary Water flow rate.
	RO	IF a VCT high level occurs, THEN verify LCV-115A, VCT/HLDP TK DIV, diverts Letdown flow to Holdup Tanks.
	RO	IF any of the following conditions occur, THEN stop the dilution by placing the RCS MAKEUP SYSTEM switch in STOP: - Rod motion is blocked. - Rod motion is in the wrong direction. - Subcritical Count Rate increases by a factor of two. - The desired condition is exceeded. - PWST level decreases by more than expected.
	RO	WHEN the desired amount of Primary Water has been added to the RCS, THEN verify the following: - FCV-114A, PW TO BLENDER, closes - FCV-114B, BLENDED MU TO VCT, closes - The operating Primary Water Pump stops - The RCS MAKEUP SYSTEM is off
	RO	Return the RCS Makeup System to automatic operation by performing the following: 1) Verify controller FCV-114A, PRIMARY WTR FLOW DILUTE MODE, in AUTO. 2) Place RCS MAKEUP MODE selector switch in AUTO.

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 1

Event Description: ***Power Ramp with Control of Reactivity (DILUTION)***

Time	Position	Applicant's Actions or Behaviors
	RO	***CAUTION: Failure to position the RCS MAKEUP SYSTEM switch to the START position will prevent the Boron concentration control system from operating properly.*** Place RCS MAKEUP SYSTEM switch in START.
	RO	Record, in AUTO LOG, the total amount of Primary Water added during the dilution, as indicated by PRIMARY WATER TOTALIZER, YIC-114.
	BOP	WHEN Extraction Steam pressure at the 5A and 5B FW Heaters is greater than 50 psig, THEN perform the following: 1. Check 5A and 5B Heater extraction steam pressure at 50 psig or greater. 2. Open ES-33, HEATER 5A EXTR STEAM TO PRV-1985. 3. Open AS-319, PRV-1985 INLET DRAIN, until a steady flow of steam is observed. 4. Close AS-319. 5. Slowly open AS-323, PRV-1985 OUTLET, to allow pressure to equalize with system pressure. 6. Shutdown Auxiliary Boilers IAW OP-401.
	BOP	WHEN the highest indicator of Reactor Power listed on Attachment 10.1 indicates 60% power, OR as directed by the Reactor Engineer, THEN depress the HOLD pushbutton AND maintain indicated power.
	RO	Record the data required on Attachment 10.1.

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 2

Event Description: ***Condensate Pump 'A' Trip***

Time	Position	Applicant's Actions or Behaviors
		SIMULATOR OPERATOR INSTRUCTIONS: ENSURE THE SECOND MAIN FEED PUMP HAS BEEN STARTED PRIOR TO INSERTING THIS MALFUNCTION.
	BOP	Diagnoses Trip of Condensate Pump 'A' and Main Feed Pump 'A' - Condensate Pump 'A' control switch green light illuminated - FW Pump 'A' control switch green light illuminated - FW flows decreasing - SG levels decreasing - FW FCVs opening with demand increasing - APP-007-A1, COND PUMP A MOTOR OVLD/TRIP, illuminated - APP-007-D5, FW HDR LO PRESS, illuminated
	SRO	Enters and directs the actions of AOP-010, "Main Feedwater / Condensate Malfunction"
	BOP	***IMMEDIATE ACTION*** Check FRVs controlling properly in AUTO or take manual control of affected FRV(s) and control level by matching feed flow and steam flow
	SRO	If a reactor trip point is being approached, then direct a reactor trip and transition to PATH-1
	SRO	Determines appropriate step to perform for Main Feed Pump and Condensate Pump trip

Op-Test Number: ______	Scenario Number: 3 (Spare)	Event Number: 2
Event Description: ***Condensate Pump 'A' Trip***		

Time	Position	Applicant's Actions or Behaviors
	SRO	Check Reactor Power less than 70%
	SRO	Check Reactor Power greater than 50%
	BOP	Reduce turbine load at 1%/min to 5%/min to achieve reactor power less than 50%
	BOP	Check at least one Main Feed Pump running
	BOP	If SG level is NOT at or trending to program level, then take manual control of the FRVs, restore level, match feed and steam flows, and then place FRVs back in AUTO
	RO	If Tavg is NOT at or trending to Tref, then place Rod Control Selector switch in manual, restore Tavg to within +0.5 to -2.5 °F of Tref, then place switch back in AUTO

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 2

Event Description: ***Condensate Pump 'A' Trip***

Time	Position	Applicant's Actions or Behaviors
	SRO	Contact Maintenance to troubleshoot and correct the feedwater problem
	SRO	Implement the EALs
	SRO	If power change greater than 15% in one hour, then implement TS SR 3.4.16.2 for Iodine sampling requirements
	RO	***CONTINUOUS ACTION*** Check APP-005-B5, ROD BANKS A/B/C/D LO LIMIT, extinguished
	RO	Monitor AFD to ensure compliance with TS 3.2.3
	SRO	Notify Load Dispatcher of the Unit's load capability

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 3

Event Description: ***Pressurizer Level Transmitter (459) High Failure***

Time	Position	Applicant's Actions or Behaviors
	RO	Diagnoses high failure of Pressurizer Level transmitter LT-459 - LC-459G demand decreasing - LI-459A increasing - LR-459 red pen decreasing - Backup heaters energized - Charging pump speed decreasing - APP-003-F3, CHG PUMP LO SPEED, illuminated - APP-003-E8, PZR CONTROL HI/LO LVL, illuminated
	SRO	Enters and directs the actions of AOP-025, "RTGB Instrument Failure," Section B, for "Pressurizer Level Transmitter Failure"
	RO	Determines letdown has NOT isolated
	RO	Places Pressurizer Level Controller, LC-459G, in the MAN position
	RO	Restore PZR level to between 22% to 53%
	RO	Check number of operable PZR Level channels is TWO

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 3

Event Description: ***Pressurizer Level Transmitter (459) High Failure***

Time	Position	Applicant's Actions or Behaviors
	RO	Place, LM-459, PZR Level, in the 461 REPL 459 position
	RO	Verify selector switch LR-459 selected to REC 461
	RO	***CONTINUOUS ACTION*** Place PZR Level Controller LC-459G in automatic when PZR level is within $\pm$1% of programmed reference level
	SRO	Direct the actions of OWP-030, PLT-1, "Pressurizer Level Transmitter LT-459," to remove 459 from service
	SRO	***SELECTED PRECAUTION*** 1) Refer to ITS Table 3.3.1-1 Item 8 for RPS OPERABILITY requirements in MODE 1. Refer to ITS Table 3.3.3-1 Item 12 for PAM instrumentation OPERABILITY requirements in MODES 1, 2, and 3. Refer to ITS LCO 3.3.4 for Remote Shutdown System OPERABILITY requirements in MODES 1, 2, and 3.

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 3

Event Description: ***Pressurizer Level Transmitter (459) High Failure***

Time	Position	Applicant's Actions or Behaviors
	RO	Perform the following RTGB switch alignment: - LM-459 PRESS PROT & CONT in 461 REPL 459
	SRO	Direct the tripping of the following bistables in the Hagan Racks - PRZR HI LEVEL LC-459A-1 - PRZR LO LEVEL LC-459A-2
	SRO	Return to Main Body of procedure (AOP-025)
	SRO	Implement the EALs
	SRO	Refer to Technical Specifications - TS Table 3.3.1-1 Item 8, RPS Instrumentation (6 hours to trip bistables) - TS Table 3.3.3-1 Item 12, PAM Instrumentation (6 hours to Mode 3 if less than 2 channels) - TS Table 3.3.4, Remote Shutdown System (30 days to restore instrument)

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 4

Event Description: ***Steam Generator 'B' Feed Flow Transmitter (487) Low Failure***

Time	Position	Applicant's Actions or Behaviors
	BOP	Diagnoses low failure of SG 'B' feed flow transmitter FT-487 - SG 'B' level increasing - FCV-488 demand increasing and opening - FR-488 green pen decreasing - APP-006-B2, SG B STM > FW FLOW, illuminated - APP-006-B3, SG B LVL DEV, illuminated
	SRO	Enters and directs the actions of AOP-025, "RTGB Instrument Failure," Section E, for "SG Feed Flow Transmitter Failure"
	BOP	***IMMEDIATE ACTION*** Place FRV 'A' (FCV-478) in MANUAL
	BOP	***IMMEDIATE ACTION*** Restore SG 'A' level to between 39% and 52%
	BOP	Place SG 'B' feed flow selector switch FR-488, SG 'B' FEED FLOW to the CH 486 position
	BOP	***CONTINUOUS ACTION*** When SG 'B' Level is within $\pm$1% of programmed level, then place FCV-478 back in AUTO

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 4

Event Description: ***Steam Generator 'B' Feed Flow Transmitter (487) Low Failure***

Time	Position	Applicant's Actions or Behaviors
	SRO	Direct the actions of OWP-026, FWF-4, "Steam Generator "B" Feedwater Flow Transmitter FT-487," to remove 487 from service
	SRO	***SELECTED PRECAUTIONS*** 1) Ensure FR-488 Feed Flow Selector switch on the RTGB is selected to FT-486 prior to flow transmitter isolation. 2) Refer to TECH SPEC Table 3.5-2 (ITS Table 3.3.1-1 Item 14) for Feedwater flow channel OPERABILITY and applicability requirements. 3) With Reactor Trip Breakers closed, ensure "B" S/G level channels LT-484 AND LT-485 are in service.
	BOP	Perform the following RTGB switch alignment: - FR-488 FEEDWATER FLOW in CH 486
	SRO	Direct the tripping of the following bistable in the Hagan Racks - SG NO 2 STM-FW FLO DEV FC-488B1
	SRO	Return to Main Body of procedure (AOP-025)

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 4

Event Description: ***Steam Generator 'B' Feed Flow Transmitter (487) Low Failure***

Time	Position	Applicant's Actions or Behaviors
	SRO	Implement the EALs
	SRO	Refer to Technical Specifications - TS Table 3.3.1-1 Item 14, RPS Instrumentation (6 hours to trip bistable)

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 5

Event Description: ***Automatic Rod Motion with No Demand***

Time	Position	Applicant's Actions or Behaviors
		SIMULATOR OPERATOR INSTRUCTIONS: ENSURE ROD CONTROL SYSTEM HAS BEEN PLACED IN AUTOMATIC PRIOR TO INSERTING THIS MALFUNCTION.
	RO	Diagnoses low failure of Tref Input to Rod Control System - Rods stepping inward with no turbine load change in progress - TR-408 green pen decreasing - APP-003-D4, TAVG/TREF DEV, illuminated
	SRO	Enters and directs the actions of AOP-001, "Malfunction of Reactor Control System"
	RO	***IMMEDIATE ACTION*** Check unwarranted rod motion in progress
	RO	***IMMEDIATE ACTION*** Check Reactor Power GREATER THAN 15%
	RO	***IMMEDIATE ACTION*** If ROD BANK SELECTOR in AUTO, then place in MANUAL

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 5

Event Description: ***Automatic Rod Motion with No Demand***

Time	Position	Applicant's Actions or Behaviors
	RO	***IMMEDIATE ACTION*** Check unwarranted rod motion STOPPED
	SRO	Goes To AOP-001, Section C, for "Continuous Rod Motion"
	RO	Determines ROD BANK SELECTOR was NOT in INDIVIDUAL BANK SELECT when problem occurred
	RO	Stop any boron dilution in progress
	RO	Check APP-005-B5, ROD BANKS A/B/C/D LO LIMIT, extinguished
	RO	***CONTINUOUS ACTION*** Check Reactor Power LESS THAN OR EQUAL TO 100%

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 5

Event Description: ***Automatic Rod Motion with No Demand***

Time	Position	Applicant's Actions or Behaviors
	RO	Maintain Tavg within +0.5 to -2.5 oF of Tref using manual rod control
	SRO	Contact I&C and Reactor Engineering to troubleshoot and correct the problem
	SRO	Implement the EALs
	SRO	Review Technical Specifications and determine NO Technical Specifications applicable

Op-Test Number: ________	Scenario Number: 3 (Spare)	Event Number: 6
Event Description: ***Main Steam Break Inside Containment with Valve Failures (PATH-1 ACTIONS)***		

Time	Position	Applicant's Actions or Behaviors
	CREW	Diagnoses Main Steamline Break Inside Containment - Containment Pressure increasing - RCS Tavg decreasing - NIS power increasing - APP-006-A2/A3/A4, SG A/B/C STM > FW FLOW, illuminated
	SRO	Enters and directs the actions of PATH-1
	RO	***IMMEDIATE ACTION*** Verify Reactor Trip
	SRO	***IMMEDIATE ACTION*** Verify Turbine Trip

Op-Test Number: ________	Scenario Number: 3 (Spare)	Event Number: 6
Event Description: ***Main Steam Break Inside Containment with Valve Failures (PATH-1 ACTIONS)***		

Time	Position	Applicant's Actions or Behaviors
	BOP	***IMMEDIATE ACTION*** Verify E-1 and E-2 Energized
	RO	***IMMEDIATE ACTION*** Verify SI Initiated or manually initiate SI
	SRO	Open Foldout 'A'
	RO	***FOLDOUT ITEM*** IF BOTH conditions below are met, THEN stop all RCPs: - SI Pumps - AT LEAST ONE RUNNING AND CAPABLE OF DELIVERING FLOW TO THE CORE - RCS Subcooling - LESS THAN 55 °F ***(Adverse Containment)***
	RO	Verify Phase A Isolation valves CLOSED
	BOP	Verify FW Isolation valves CLOSED

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 6

Event Description: ***Main Steam Break Inside Containment with Valve Failures (PATH-1 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	BOP	Verify both FW Pumps TRIPPED
	BOP	Verify both MDAFW Pumps RUNNING
	BOP	If additional feedwater is required, then start the SDAFW Pump
	RO	Verify two SI Pumps RUNNING
	RO	Determines only one RHR Pumps RUNNING due to RHR Pump 'A' being under clearance
	RO	Verify SI valves properly aligned

Op-Test Number: ________	Scenario Number: 3 (Spare)	Event Number: 6		

Event Description: ***Main Steam Break Inside Containment with Valve Failures (PATH-1 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	RO	Verify at least one CCW Pump RUNNING
	BOP	Verify all SW Pumps RUNNING
	BOP	Verify BOTH SW Booster Pumps RUNNING
	BOP	Verify CV Fans HVH-1, HVH-2, HVH-3, and HVH-4 RUNNING
	BOP	Verify ISVW System INITIATED
	BOP	Verify Control Room Ventilation aligned for Pressurization Mode

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 6

Event Description: ***Main Steam Break Inside Containment with Valve Failures (PATH-1 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	BOP	Verify both EDGs RUNNING
	BOP	***CONTINUOUS ACTION*** Restart Battery Chargers within 30 minutes of power loss using OP-601, "DC Supply System"
	RO	***CONTINUOUS ACTION*** If CV pressure exceeds 10 psig, then perform the following: - Verify CV Spray initiated - Verify all CV Spray Pumps RUNNING with valves properly aligned - Verify approximately 12 gpm Spray Additive Tank flow
	BOP	***CONTINUOUS ACTION*** Determines Phase B Isolation valves are NOT all CLOSED
	BOP	Attempts Manual actuation by depressing BOTH CV SPRAY pushbuttons simultaneously, and determines Phase B valves have NOT closed

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 6

Event Description: ***Main Steam Break Inside Containment with Valve Failures (PATH-1 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	BOP	Established Phase B Containment Isolation by placing the following valves in CLOSE: - CVC-381, SEAL WTR RTRN ISO - FCV-626, THERM BAR FLOW CONT - CC-735, THERM BAR OUT ISO - CC-716A, CCW TO RCP ISO - CC-716B, CCW TO RCP ISO - CC-730, BRG OUTLET ISO ***NOTE: May use status lights to determine required valves or may reference EPP Supplement B.*** **CRITICAL TASK TO ESTABLISH PHASE B ISOLATION TO PREVENT LEAKAGE PATH FROM CONTAINMENT TO ATMOSPHERE.**
	RO	***CONTINUOUS ACTION*** STOP all RCPs
	BOP	Determines MSIV Bypasses are CLOSED, but determines MSIVs have NOT closed and closes by placing switches in CLOSE POSITION **CRITICAL TASK TO PREVENT EXCEEDING DESIGN CONTAINMENT PRESSURE DUE TO FAILURE OF STEAMLINE CHECK VALVE TO CLOSE, ALLOWING ALL 3 SGs TO BLOWDOWN TO CONTAINMENT.**
	SRO	Direct an operator to locally open breaker for HVS-1, AUX BUILDING SUPPLY FAN, at MCC-5 (7J) within 60 minutes of SI initiation

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 6

Event Description: ***Main Steam Break Inside Containment with Valve Failures (PATH-1 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	RO	If RCS pressure is LESS THAN [1250] psig, then verify SI flow or align SI valves as necessary
	RO	If RCS pressure is LESS THAN 125 psig, then verify RHR flow or align RHR valves as necessary
	BOP	Verify at least 300 gpm AFW flow available or level in at least one SG greater than 8%
	BOP	Verify AFW valves properly aligned
	BOP	Control AFW flow to maintain SG levels between [18]% and 50% ***NOTE: May isolate AFW flow to SG 'B' due to SG being faulted.***
	RO	If RCP Thermal Barrier Cooling Water High OR Low Flow alarms are illuminated, then verify at least one Charging Pump running

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 6

Event Description: ***Main Steam Break Inside Containment with Valve Failures (PATH-1 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	BOP	Place Steam Dump Mode Selector Switch to STEAM PRESS mode
	BOP	If RCS temperature is LESS THAN 547 °F, then perform the following: - Attempt to limit the cooldown - If RCS cooldown continues and is NOT due to SI flow, then CLOSE the MSIVs and MSIV Bypasses ***NOTE: MSIVs and Bypass Valves should have been closed by this time.***
	RO	Verify proper operation of PZR PORVs and Spray
	RO	If RCS subcooling if less than [55]°F AND at least one SI pump is running, then STOP all RCPs
	SRO	Reset SPDS, initiate monitoring of CSFSTs, and go to EPP-11, "Faulted SG Isolation"

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 6

Event Description: ***Main Steam Break Inside Containment with Valve Failures (EPP-11 and SUPPLEMENT 'G' ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	SRO	Enters and directs the actions of EPP-11, "Faulted Steam Generator Isolation"
	SRO	Maintain at least one SG available for RCS Cooldown
	BOP	Identify SGs 'A' and 'C' as being intact
	BOP	Identify SG 'B' as being faulted due to pressure decreasing in an uncontrolled manner or being completely depressurized
	SRO	Directs the isolation of SG 'B' using EPP Supplement G, "SG Isolation"
	BOP	Check SG 'B' faulted

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 6

Event Description: ***Main Steam Break Inside Containment with Valve Failures (EPP-11 and SUPPLEMENT 'G' ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	BOP	Verify V1-3B, MSIV is CLOSED
	BOP	Verify MS-353B, MSIV V1-3B is CLOSED
	BOP	Verify FRV B is CLOSED
	BOP	Verify FRV B BYP is CLOSED
	BOP	Verify V2-6B, FW HDR SECTION Valve is CLOSED
	BOP	Verify V2-14B, SDAFW PUMP DISCH Valve is CLOSED

Op-Test Number: ________	Scenario Number: 3 (Spare)	Event Number: 6
Event Description:	***Main Steam Break Inside Containment with Valve Failures (EPP-11 and SUPPLEMENT 'G' ACTIONS)***	

Time	Position	Applicant's Actions or Behaviors
	BOP	Verify V2-16B, AFW HDR DISCH Valve is CLOSED
	BOP	Verify STEAM LINE PORV is CLOSED
	BOP	Verify V1-8B, SDAFW STEAM SHUTOFF is CLOSED
	BOP	Verify SG 'B' Blowdown and Blowdown Sample Valves are CLOSED
	BOP	Check SG 'B' MSIV above and below seat drain valves are CLOSED
	SRO	Dispatch an operator to the E-1 / E-2 room to perform the following: - Open breaker V2-14B, SDAFW PUMP TO SG B (MCC-9, 1C) - Open breaker V1-8B, SDAFW PUMP STEAM ISOL (MCC-6, 16M)

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 6

Event Description: ***Main Steam Break Inside Containment with Valve Failures (EPP-11 and SUPPLEMENT 'G' ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	SRO	Dispatch an operator to the Aux Bldg to open breaker V2-16B, MDAFW PUMP HEADER DISCHARGE TO SG B (MCC-10, 4F)
	SRO	Dispatch an operator to the Pipe Jungle to close MS-29, SG 'B' BYPASS DRM & WARM-UP LINE TO AFW PUMP
	BOP	Check all faulted and ruptured SGs ISOLATED
	BOP	Determine NO SG is ruptured
	SRO	Returns to EPP-11, Step 4
	SRO	Maintain a Faulted SG isolated during subsequent recovery actions unless needed for cooldown

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 6

Event Description: ***Main Steam Break Inside Containment with Valve Failures (EPP-11 and SUPPLEMENT 'G' ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	BOP	If CST level decrease below 10%, then align Service Water to the suction of the AFW Pumps using OP-402, "Auxiliary Feedwater System"
	BOP	Check available Secondary Radiation Monitors NORMAL
	SRO	Transition to PATH-1, Entry Point C, and direct the actions of PATH-1

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 6

Event Description: ***Main Steam Break Inside Containment with Valve Failures (PATH-1 ACTIONS AFTER SG ISOLATION)***

Time	Position	Applicant's Actions or Behaviors
	SRO	Reset SPDS and initiate monitoring of CSFSTs
	SRO	Open Foldout B
	SRO	***FOLDOUT ITEM*** If ALL of the following condition occur, then go to EPP-7, "SI Termination" - RCS Subcooling greater than [55] °F - Heat Sink established by having either: Total Feed flow to intact SGs greater than 300 gpm or 0.2 x 10^6 lbm/hr OR Level in at least one intact SG greater than [18%] - RCS Pressure greater than [1750] psig AND stable or increasing - PZR Level greater than [32%] ***NOTE: It is expected that once SG 'B' is isolated and has completed blowing dry that these conditions will be soon met. However, the scenario is written to include all steps until the body of PATH-1 directs a transition to EPP-7.***

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 6

Event Description: ***Main Steam Break Inside Containment with Valve Failures (PATH-1 ACTIONS AFTER SG ISOLATION)***

Time	Position	Applicant's Actions or Behaviors
	SRO	Request periodic activity sampling of all SGs
	RO	Determine NO RCPs are running
	BOP	Determine SG 'B' is faulted and has been isolated per EPP-11
	BOP	***CONTINUOUS ACTION*** When SG 'B' completes drying out, then dump steam from SGs 'A' and 'C' to control RCS repressurization
	BOP	Control AFW flow to maintain intact SG levels between [18%] and 50%
	BOP	Determine by level indication and radiation monitors that NO SGTRs exist

Op-Test Number: ______	Scenario Number: 3 (Spare) Event Number: 6
Event Description:	***Main Steam Break Inside Containment with Valve Failures (PATH-1 ACTIONS AFTER SG ISOLATION)***

Time	Position	Applicant's Actions or Behaviors
	RO	Verify proper operation of the PZR PORVs
	RO	Reset SI
	RO / BOP	***CONTINUOUS ACTION*** If offsite power is lost, then restart ESF equipment
	RO	Reset CV Spray
	RO	Reset Phase A and Phase B
	BOP	Establish instrument air to containment

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 6

Event Description: ***Main Steam Break Inside Containment with Valve Failures (PATH-1 ACTIONS AFTER SG ISOLATION)***

Time	Position	Applicant's Actions or Behaviors
	BOP	Verify offsite power available to a Charging Pump
	RO	Verify at least one Charging Pump running
	RO	Establish charging flow
	RO	***CONTINUOUS ACTION*** When containment pressure decreases below 4 psig, then stop CV Pumps and close SI-880 valves
	RO	Verify RCS Subcooling greater than [55] °F

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 6

Event Description: ***Main Steam Break Inside Containment with Valve Failures (PATH-1 ACTIONS AFTER SG ISOLATION)***

Time	Position	Applicant's Actions or Behaviors
	BOP	Verify Heat Sink established by having either: - Total Feed flow to intact SGs greater than 300 gpm or 0.2 x 106 lbm/hr OR - Level in at least one intact SG greater than [18%]
	RO	Verify RCS Pressure greater than [1750] psig AND stable or increasing
	RO	Verify PZR Level greater than [32%]
	SRO	Transition to and direct the actions of EPP-7, "SI Termination"

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 6

Event Description: ***Main Steam Break Inside Containment with Valve Failures (EPP-7 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	SRO	Open Foldout B
	BOP	Verify SW pressure between 40 psig and 50 psig
	BOP	Check DC Buses A and B are ENERGIZED
	BOP	Check all of the following annununciators EXTINGUISHED - APP-010-E2, EDG A LUBE OIL HI/LO TEMP - APP-010-E3, EDG B LUBE OIL HI/LO TEMP - APP-010-F2, EDG A COOL WTR HI/LO TEMP - APP-010-F3, EDG A COOL WTR HI/LO TEMP
	BOP	***CAUTION: A loss of DC power may occur if the DC Busses are at maximum load and the Battery Chargers are not restarted within 60 minutes of a loss of all AC power.*** Check Emergency Buses energized by offsite power

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 6

Event Description: ***Main Steam Break Inside Containment with Valve Failures (EPP-7 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	RO	Check PZR Heater have power available
	BOP	Check all non-emergency AC buses are energized by offsite power
	BOP	***CONTINUOUS ACTION*** Verify that at both SW Booster Pumps are running
	RO / BOP	***CONTINUOUS ACTION*** If offsite power is lost after SI is Reset, then manually restart ESF equipment
	RO	Reset SI
	RO	Reset containment isolation Phase A and Phase B

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 6

Event Description: ***Main Steam Break Inside Containment with Valve Failures (EPP-7 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	RO / BOP	***CONTINUOUS ACTION*** Reset Feedwater Isolation as follows: - Check APP-004 (First Out) annunciators all EXTINGUISHED - CLOSE the Reactor Trip Breakers - Verify all FRV controllers are in MAN with demand signal set to 0 - For each SG, momentarily place the Key Switch to the OVRD / RESET position AND then return to the NORM position
	SRO	Direct an operator to reset the IVSW System in the computer room, as follows: - Depress the IVSW RESET PCV-1922A pushbutton in Relay Cab ARP-1 - Depress the IVSW RESET PCV-1922B pushbutton in Relay Cab ARP-2
	BOP	***CONTINUOUS ACTION*** Establish IA to containment as follows: - Check APP-002-F7, INSTR AIR HDR LO PRESS, extinguished - Momentarily place IA PCV-1716, INSTRUMENT AIR ISO TO CV, to RESET and then return to AUTO - Check PCV-1716 open
	RO	Verify charging is already established
	RO	Stop all running SI Pumps

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 6

Event Description: ***Main Steam Break Inside Containment with Valve Failures (EPP-7 ACTIONS)***

Time	Position	Applicant's Actions or Behaviors
	RO	Stop RHR Pump 'B' ***NOTE: RHR Pump 'A' is under clearance.***
	RO	Check Reinitiation Criteria as follows: - RCS Subcooling greater than [55 °F], AND - PZR Level greater than [32%]
		TERMINATE THE SCENARIO WHEN AN SI HAS BEEN TERMINATED PER EPP-7 AND SI REINITIATION CRITERIA HAS BEEN VERIFIED.

Op-Test Number: ________ Scenario Number: 3 (Spare) Event Number: 7

Event Description: ***Phase 'B' Containment Isolation Fails to Automatically Actuate***

Time	Position	Applicant's Actions or Behaviors
		ACTIONS FOR THIS EVENT ARE INCLUDED IN THE ACTIONS FOR EVENT 6.

Op-Test Number: ______ Scenario Number: 3 (Spare) Event Number: 8

Event Description: ***Event Classification***

Time	Position	Applicant's Actions or Behaviors
	SRO	Classifies the event as an Alert
		NOTES: ***1) Based on High Containment Sump Level causing CV to be Jeopardized (single FPB barrier jeopardized).*** ***2) Classification of the event following the scenario is considered 20% of the Performance Rating for JPM SRO-A.4.***

Section	Contents		Section	Contents
A	Changes		M	B.1.a
B	ES-201-2		N	B.1.b
C	ES-301-3		O	B.1.c
D	ES-301-4		PQ	B.1.d
E	ES-301-5		R	B.1.e
F	ES-301-6		S	B.1.f
G	ES-401-7		T	B.1.g
H	RO Outline & References		UV	B.2.a
IJ	SRO Outline		W	B.2.b
K	SRO References		XYZ	B.2.c
L	SRO Section B Outlines			

OPERATING TEST NO.: RNP RO-4, RO-5, RO-6

Applicant Type	Evolution Type	Minimum Number	Candidate / Scenario Number / Position					
			RO-4		RO-5		RO-6	
			Scen. 2 RO	Scen. 1 BOP	Scen. 1 RO	Scen. 2 BOP	Scen. 1 RO	Scen. 2 BOP
RO	Reactivity	1	1		1-3		1-3	
	Normal	1		1		1		1
	Instrument / Component	4	3-5	2-3	4-5	2-4	4-5	2-4
	Major	1	6	6	6	6	6	6
SRO-I **As RO**	Reactivity	1						
	Normal	0						
	Instrument / Component	2						
	Major	1						
SRO-I **As SRO**	Reactivity	0						
	Normal	1						
	Instrument / Component	2						
	Major	1						
SRO-U	Reactivity	0						
	Normal	1						
	Instrument / Component	2						
	Major	1						

Instructions:
(1) Enter the operating test number and Form ES-D-1event numbers for each evolution type.
(2) Reactivity manipulations may be conducted under normal or controlled abnormal conditions (refer to Section D.4.d) but must be significant per Section C.2.a of Appendix D.
(3) Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirement.

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OPERATING TEST NO.: RNP RO-1, RO-2, RO-3

Applicant Type	Evolution Type	Minimum Number	Candidate / Scenario Number / Position					
			RO-1		RO-2		RO-3	
			Scen. 1 RO	Scen. 2 BOP	Scen. 2 RO	Scen. 1 BOP	Scen. 1 RO	Scen. 2 BOP
RO	Reactivity	1	1-3		1		1-3	
	Normal	1		1		1		1
	Instrument / Component	4	4-5	2-4	3-5	2-3	4-5	2-4
	Major	1	6	6	6	6	6	6
SRO-I As RO	Reactivity	1						
	Normal	0						
	Instrument / Component	2						
	Major	1						
SRO-I As SRO	Reactivity	0						
	Normal	1						
	Instrument / Component	2						
	Major	1						
SRO-U	Reactivity	0						
	Normal	1						
	Instrument / Component	2						
	Major	1						

Instructions:
(1) Enter the operating test number and Form ES-D-1event numbers for each evolution type.
(2) Reactivity manipulations may be conducted under normal or controlled abnormal conditions (refer to Section D.4.d) but must be significant per Section C.2.a of Appendix D.
(3) Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirement.

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OPERATING TEST NO.: SRO-I

Applicant Type	Evolution Type	Minimum Number	Candidate / Scenario Number / Position					
			SRO I-1		SRO I-2			
			Scen. 1 SRO	Scen. 2 RO	Scen. 1 SRO	Scen. 2 RO		
RO	Reactivity	1						
	Normal	1						
	Instrument / Component	4						
	Major	1						
SRO-I As RO	Reactivity	1		1		1		
	Normal	0						
	Instrument / Component	2		3-5		3-5		
	Major	1		6		6		
SRO-I As SRO	Reactivity	0	1-3		1-3			
	Normal	1	1		1			
	Instrument / Component	2	2-3-4-5		2-3-4-5			
	Major	1	6		6			
SRO-U	Reactivity	0						
	Normal	1						
	Instrument / Component	2						
	Major	1						

Instructions:
(1) Enter the operating test number and Form ES-D-1event numbers for each evolution type.
(2) Reactivity manipulations may be conducted under normal or controlled abnormal conditions (refer to Section D.4.d) but must be significant per Section C.2.a of Appendix D.
(3) Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirement.

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OPERATING TEST NO.: SRO-U

Applicant Type	Evolution Type	Minimum Number	Candidate / Scenario Number / Position					
			SRO U-1		SRO U-2			
			Scen. 1 SRO	Scen. 2 SRO	Scen. 1 SRO	Scen. 2 SRO		
RO	Reactivity	1						
	Normal	1						
	Instrument / Component	4						
	Major	1						
SRO-I As RO	Reactivity	1						
	Normal	0						
	Instrument / Component	2						
	Major	1						
SRO-I As SRO	Reactivity	0						
	Normal	1						
	Instrument / Component	2						
	Major	1						
SRO-U	Reactivity	0	1-3	1	1-3	1		
	Normal	1	1	1	1	1		
	Instrument / Component	2	2-3-4-5	2-3-4-5	2-3-4-5	2-3-4-5		
	Major	1	6	6	6	6		

Instructions:

(1) Enter the operating test number and Form ES-D-1event numbers for each evolution type.

(2) Reactivity manipulations may be conducted under normal or controlled abnormal conditions (refer to Section D.4.d) but must be significant per Section C.2.a of Appendix D.

(3) Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirement.

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OPERATING TEST NO.: **RNP**

Competencies	RO-1 SCENARIO 1 RO	RO-1 SCENARIO 2 BOP	RO-2 SCENARIO 2 RO	RO-2 SCENARIO 1 BOP	RO-3 SCENARIO 1 RO	RO-3 SCENARIO 2 BOP	RO-4 SCENARIO 2 RO	RO-4 SCENARIO 1 BOP	RO-5 SCENARIO 1 RO	RO-5 SCENARIO 2 BOP	RO-6 SCENARIO 1 RO	RO-6 SCENARIO 2 BOP
Understand and Interpret Annunciators and Alarms	4-5-6-7-8	2-4-6	3-5-6	2-3-6-7	4-5-6-7-8	2-4-6	3-5-6	2-3-6-7	4-5-6-7-8	2-4-6	4-5-6-7-8	2-4-6
Diagnose Events and Conditions	4-5-6-7-8	2-4-6-7	3-5-6-7	2-3-6-7	4-5-6-7-8	2-4-6-7	3-5-6-7	2-3-6-7	4-5-6-7-8	2-4-6-7	4-5-6-7-8	2-4-6-7
Understand Plant and System Response	1-3-4-5-6-7	1-2-4-6-7	1-3-5-6-7	1-2-3-6-7	1-3-4-5-6-7	1-2-4-6-7	1-3-5-6-7	1-2-3-6-7	1-3-4-5-6-7	1-2-4-6-7	1-3-4-5-6-7	1-2-4-6-7
Comply With and Use Procedures (1)	1-3-4-5-6-7-8	1-2-4-6-7	1-3-5-6-7	1-2-3-6-7	1-3-4-5-6-7-8	1-2-4-6-7	1-3-5-6-7	1-2-3-6-7	1-3-4-5-6-7-8	1-2-4-6-7	1-3-4-5-6-7-8	1-2-4-6-7
Operate Control Boards (2)	1-3-4-5-6-7-8	1-2-4-6-7	1-3-5-6-7	1-2-3-6-7	1-3-4-5-6-7-8	1-2-4-6-7	1-3-5-6-7	1-2-3-6-7	1-3-4-5-6-7-8	1-2-4-6-7	1-3-4-5-6-7-8	1-2-4-6-7
Communicate and Interact With the Crew	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL
Demonstrate Supervisory Ability (3)												
Comply With and Use Tech. Specs. (3)												

Notes:

(1) Includes Technical Specification compliance for an RO.

(2) Optional for an SRO-U.

(3) Only applicable to SROs.

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OPERATING TEST NO.: **RNP**

Competencies	SROU-1		SROU-2		SROI-1		SROI-2	
	SCENARIO		SCENARIO		SCENARIO		SCENARIO	
	1 SRO	2 SRO	1 SRO	2 SRO	1 SRO	2 RO	1 SRO	2 RO
Understand and Interpret Annunciators and Alarms	2-3-4-5-6-7-8	2-3-4-5-6	2-3-4-5-6-7-8	2-3-4-5-6	2-3-4-5-6-7-8	3-5-6	2-3-4-5-6-7-8	3-5-6
Diagnose Events and Conditions	2-3-4-5-6-7-8	2-3-4-5-6-7	2-3-4-5-6-7-8	2-3-4-5-6-7	2-3-4-5-6-7-8	3-5-6-7	2-3-4-5-6-7-8	3-5-6-7
Understand Plant and System Response	1-2-3-4-5-6-7	1-2-3-4-5-6-7	1-2-3-4-5-6-7	1-2-3-4-5-6-7	1-2-3-4-5-6-7	1-3-5-6-7	1-2-3-4-5-6-7	1-3-5-6-7
Comply With and Use Procedures (1)	ALL	ALL	ALL	ALL	ALL	1-3-5-6-7	ALL	1-3-5-6-7
Operate Control Boards (2)						1-3-5-6-7		1-3-5-6-7
Communicate and Interact With the Crew	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL
Demonstrate Supervisory Ability (3)	ALL	ALL	ALL	ALL	ALL		ALL	
Comply With and Use Tech. Specs. (3)	2-4-5	2-4-6	2-4-5	2-4-6	2-4-5		2-4-5	

Notes:

(1) Includes Technical Specification compliance for an RO.

(2) Optional for an SRO-U.

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Facility: **RNP** Date of Exam: **26-Mar-01** Exam Level: **RO**

Tier	Group	K/A Category Points											Point Total
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	
1 Emergency & Abnormal Plant Evolutions	1	2	2	3				3	3			3	16
	2	2	2	4				3	4			2	17
	3	1	0	1				0	0			1	3
	Tier Totals	5	4	8				6	7			6	36
2 Plant Systems	1	2	2	2	2	2	2	2	3	2	2	2	23
	2	1	2	2	2	2	2	1	2	2	2	2	20
	3	1	1	1	2	0	1	1	0	1	0	0	8
	Tier Totals	4	5	5	6	4	5	4	5	5	4	4	51

3 Generic Knowledge and Abilities	Cat 1	Cat 2	Cat 3	Cat 4	
	4	3	2	4	13

Notes:

1 Ensure that at least two topics from every K/A category are sampled within each tier (i.e., the "Tier Totals" in each K/A category shall not be less than two).

2 Actual point totals must match those specified in the table.

3 Select topics from many systems; avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities.

4 Systems/evolutions within each group are identified on the associated outline.

5 The shaded areas are not applicable to the category/tier.

6* The generic K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system.

7 On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings for the RO license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant-specific priorities. Enter the tier totals for each category in the table above.

8 Shaded K/As on the following pages indicate that the related questions appear ONLY on the RO examination.

Emergency and Abnormal Plant Evolutions - Tier 1/Group 1

	E/AK1	E/AK2	E/AK3	E/AA1	E/AA2	G	K/A Topic(s)	Imp.	Points
000005 Inoperable/Stuck Control Rod / 1			3				Tech-Spec limits for rod mismatch	3.6	1
000015/17 RCP Malfunctions / 4				20			RCP malfunctions: Bearing temperature	2.7	1
W/E09&E10 Natural Circ. / 4			1				(Nat Circ) Facility operating characteristics	3.3	1
000024 Emergency Boration / 1				5			Performance of letdown system during emergency boration	3.1	1
000026 Loss of Component Cooling Water / 8				5			CCWS radiation alarm	3.1	1
000027 Pressurizer Pressure Control System Malfunction / 3		3					Pressurizer Pressure controllers and positioners	2.6	1
000040 (W/E12) Steam Line Rupture - Excessive Heat Transfer / 4	2						(Uncont Depress all SGs) Emergency operating procedures	3.5	1
W/E08 RCS Overcooling - PTS / 4			3				(PTS) Desired operating results during emergency situations	3.7	1
000051 Loss of Condenser Vacuum / 4					2		Conditions requiring reactor and/or turbine trip	3.9	1
000055 Station Blackout / 6						2.4.1	EOP entry conditions (Station Blackout)	4.3	1
000057 Loss of Vital AC Elec. Inst. Bus / 6					20		Interlocks to restore normal equipment operation	3.6	1
000062 Loss of Nuclear Service Water / 4						2.4.24	Loss of cooling water procedures (SW)	3.3	1
000067 Plant Fire On-site / 9					4		Fire's extent of potential damage to equipment	3.1	1
000068 Control Room Evac. / 8						2.4.11	Abnormal condition procedures (Cont Room Evac)	3.4	1
000069 (W/E14) Loss of CTMT Integrity / 5	2						(High Cont Press) Emergency operating procedures	3.2	1
000074 (W/E06&E07) Inad. Core Cooling / 4		2					(Core Cooling) Facility's heat removal and operation	3.8	1
000076 High Reactor Coolant Activity / 9									
K/A Category Totals:	2	2	3	3	3	3	Group Point Total:		16

	E/AK1	E/AK2	E/AK3	E/AA1	E/AA2	G	K/A Topic(s)	Imp.	Points
000001 Continuous Rod Withdrawal / 1					3		Actions taken if automatic functions have not taken place	4.5	1
000003 Dropped Control Rod / 1						2.4.4	Entry-level for abnormal operating procedures (Dropped Rod)	4.0	1
000007 Reactor Trip - Stabilization - Recovery / 1			1				Actions contained in EOP for reactor trip	4.0	1
000008 Pressurizer Vapor Space Accident / 3									
000009 Small Break LOCA / 3									
000011 Large Break LOCA / 3 **(PSA)**						2.4.17	EOP terms and definitions (LBLOCA)	3.1	1
W/E04 LOCA Outside Containment / 3									
W/E03 LOCA Cooldown/Depress. / 4 **(PSA)**				2			(LOCA CD/Depress) Operating behavior characteristics	3.7	1
W/E11 Loss of Emergency Coolant Recirc. / 4 **(PSA)**		2					Facility's heat removal systems and proper operation	3.9	1
W/E01 & E02 Rediagnosis & SI Termination / 3			2				(SI Termination) EOP implementation	3.3	1
000022 Loss of Reactor Coolant Makeup / 2									
000025 Loss of RHR System / 4	1						Implications of loss of RHRS during all modes	3.9	1
000029 Anticipated Transient w/o Scram / 1					1		ATWS: Reactor nuclear instrumentation	4.4	1
000032 Loss of Source Range NI / 7									
000033 Loss of Intermediate Range NI / 7					11		Loss of compensating voltage	3.1	1
000037 Steam Generator Tube Leak / 3				11			SG Tube Leak: PZR level indicator	3.4	1
000038 Steam Generator Tube Rupture / 3				30			SGTR: SI and containment isolation	4.0	1
000054 Loss of Main Feedwater / 4 **(PSA)**	1						MFW line break depressurizes S/G (similar to steam break)	4.1	1
W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4 **(PSA)**					2		(Loss of Heat Sink) Adherence to procedures	3.7	1
000058 Loss of DC Power / 6			1				Use of dc control power by D/Gs	3.4	1
000059 Accidental Liquid RadWaste Rel. / 9		2					Radioactive-gas monitors	2.7	1
000060 Accidental Gaseous Radwaste Rel. / 9									
000061 ARM System Alarms / 7			2				Guidance contained in alarm response for ARM system	3.4	1
W/E16 High Containment Radiation / 9									
K/A Category Totals:	2	2	4	3	4	2	Group Point Total:		17

	E/AK1	E/AK2	E/AK3	E/AA1	E/AA2	G	K/A Topic(s)	Imp.	Points
000028 Pressurizer Level Malfunction / 2	1						PZR reference leak abnormalities	2.8	1
000036 Fuel Handling Accident / 8						2.2.28	Fuel movement procedures (Fuel Handling Accident)	2.6	1
000056 Loss of Off-site Power / 6									
000065 Loss of Instrument Air / 8									
W/E13 Steam Generator Over-pressure / 4									
W/E15 Containment Flooding / 5			1				(Cont Flooding) Coolant chemistry and effects	2.7	1
K/A Category Totals:	1	0	1	0	0	1	Group Point Total:		3

ES-401	PWR RO Examination Outline Plant Systems - Tier 2/Group 1	Form ES-401-4

	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
001 Control Rod Drive						11						CRDS reset system, rod control annunciator	2.9	3
							6					Operating CRDS controls: Reactor power	4.1	
			1									Effect of loss/malfunction of CRDS on CVCS	2.9	
003 Reactor Coolant Pump											2.1.32	Limits and precautions (RCP)	3.4	2
								5				Effects of VCT pressure on RCP seal leakoff flows	2.5	
004 Chemical and Volume Control										4		Calculation of boron concentration changes	3.2	3
		3										Power supplies to charging pumps	3.3	
							11					CVCS controls: Letdown and charging flows	3.0	
013 Engineered Safety Features Actuation								2				Consequences of excess steam demand	4.3	3
										3		Operate/monitor: ESFAS initiation	4.5	
		1										Power supplies to ESFAS/safeguards equipment	3.6	
015 Nuclear Instrumentation					4							Factors affecting accuracy of calorimetrics	2.6	2
						4						NIS: Bistables and logic circuits	3.1	
017 In-core Temperature Monitor				1								Input to subcooling monitors	3.4	1
022 Containment Cooling									1			Initiation of safeguards mode of operation	4.1	2
			2									Effect of loss of CCS on cont instruments	3.0	
056 Condensate	3											Relationships between Condensate and MFW	2.6	1
059 Main Feedwater				19								Automatic feedwater isolation	3.2	1
061 Auxiliary/Emergency Feedwater									3			AFW S/G level control on automatic start	3.9	2
(PSA)	7											AFW: Emergency water source	3.6	
068 Liquid Radwaste											2.3.11	Radiation releases (Liquid Radwaste)	2.7	1
071 Waste Gas Disposal								5				WGDS: Power failure to ARM and PRM	2.5	1
072 Area Radiation Monitoring					2							Radiation intensity changes with source distance	2.5	1
K/A Category Totals:	2	2	2	2	2	2	2	3	2	2	2	Group Point Total:		23

ES-401 PWR RO Examination Outline Form ES-401-4

Plant Systems - Tier 2/Group 2

	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
002 Reactor Coolant					10							Relationship between reactor power and RCS diff temp	3.6	1
006 Emergency Core Cooling									6			Automatic operation of valve lineups	3.9	1
010 Pressurizer Pressure Control											2.1.33	Entry-level conditions for tech specs (Pressurizer Pressure)	3.4	1
011 Pressurizer Level Control						4						Effect on operation of PZR level controllers	3.1	1
012 Reactor Protection						4						RPS: Bypass-block circuits	2.9	2
		1										Power supplies to RPS channels, components	3.3	
014 Rod Position Indication								4				Consequences of misaligned rod	3.4	1
016 Non-nuclear Instrumentation			1									Effect of loss of NNIS on RCS	3.4	1
026 Containment Spray							1					CSS controls: Containment pressure	3.9	1
029 Containment Purge				3								Automatic purge isolation	3.2	1
033 Spent Fuel Pool Cooling			3									Effect of loss on spent fuel temperature	3.0	1
035 Steam Generator				1								S/GS feature(s) providing for S/G level control	3.6	1
039 Main and Reheat Steam					8							Effect of steam removal on reactivity	3.6	1
062 AC Electrical Distribution		1										Power supplies to major system loads	3.3	1
063 DC Electrical Distribution											2.1.32	System limits and precautions (DC Electrical)	3.4	1
064 Emergency Diesel Generator										2		Adjustment of exciter voltage	3.3	1
073 Process Radiation Monitoring										1		Operate/monitor: Effluent release	3.9	1
075 Circulating Water								2				Consequences of loss of CW pumps	2.5	1
079 Station Air	1											Relationship between SAS and IAS	3.0	1
086 Fire Protection									1			Starting mechanisms of fire water pumps	2.9	1
K/A Category Totals:	1	2	2	2	2	2	1	2	2	2	2	Group Point Total:		20

PWR RO Examination Outline

Plant Systems - Tier 2/Group 3

	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
005 Residual Heat Removal			1									Effect of loss of RHRS on RCS	3.9	1
007 Pressurizer Relief/Quench Tank									1			Components which discharge to the PRT	2.7	1
008 Component Cooling Water				2								CCWS: Operation of surge tank	2.9	1
027 Containment Iodine Removal														
028 Hydrogen Recombiner and Purge Control							2					HRPS controls: Containment pressure	3.4	1
034 Fuel Handling Equipment														
041 Steam Dump/Turbine Bypass Control						3						SDS: Controller and positioners	2.7	1
045 Main Turbine Generator	18											Relationships between MT/G system and RPS	3.6	1
076 Service Water		1										Power supplies to service water	2.7	1
078 Instrument Air														
103 Containment				6								Containment isolation system	3.1	1
K/A Category Totals:	1	1	1	2	0	1	1	0	1	0	0	Group Point Total:		8

Plant-Specific Priorities

System/Topic	Recommended Replacement for ...	Reason	Points
Plant-Specific Priority Total: (limit 10)			

Facility: **RNP**	Date of Exam: **26-Mar-01**		Exam Level: **RO**	
Category	K/A #	Topic	Imp.	Points
Conduct of Operations	2.1.1	Conduct of operations requirements	3.7	1
	2.1.3	Shift turnover practices	3.0	1
	2.1.29	Conduct and verify valve lineups	3.4	1
	2.1.18	Make accurate, clear and concise logs, records, status boards, and reports	2.9	1
	Total			4
Equipment Control	2.2.11	Process for controlling temporary changes	2.5	1
	2.2.13	Tagging and clearance procedures	3.6	1
	2.2.26	Refueling administrative requirements	2.5	1
	Total			3
Radiation Control	2.3.2	Facility ALARA program	2.5	1
	2.3.1	10 CFR:20 and related facility radiation control requirements	2.6	1
	Total			2
Emergency Procedures/ Plan	2.4.22	Prioritizing safety functions during emergency operations	3.0	1
	2.4.26	Facility protection requirements including fire brigade	2.9	1
	2.4.43	Emergency communications systems and techniques	2.8	1
	2.4.45	Interpret significance of each annunciator or alarm	3.3	1
	Total			4
Tier 3 Point Total				13

Facility: **RNP**							Date of Exam: **26-Mar-01**				Exam Level: **SRO**	
Tier	Group	K/A Category Points										Point Total
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	
1 Emergency & Abnormal Plant Evolutions	1	2	2	3				2	11			4	24
	2	2	1	3				1	7			2	16
	3	1	0	1				0	0			1	3
	Tier Totals	5	3	7				3	18			7	43
2 Plant Systems	1	1	1	2	2	1	1	2	4	0	2	3	19
	2	1	2	2	2	2	1	1	2	1	2	1	17
	3	1	0	0	1	0	1	0	0	1	0	0	4
	Tier Totals	3	3	4	5	3	3	3	6	2	4	4	40
3 Generic Knowledge and Abilities				Cat 1		Cat 2		Cat 3		Cat 4			
				5		4		3		5			17

Notes:

1 Ensure that at least two topics from every K/A category are sampled within each tier (i.e., the "Tier Totals" in each K/A category shall not be less than two).

2 Actual point totals must match those specified in the table.

3 Select topics from many systems; avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities.

4 Systems/evolutions within each group are identified on the associated outline.

5 The shaded areas are not applicable to the category/tier.

6* The generic K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system.

7 On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings for the SRO license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant-specific priorities. Enter the tier totals for each category in the table above.

8 Shaded K/As on the following pages indicate that the related questions appear ONLY on the SRO examination.

Emergency and Abnormal Plant Evolutions - Tier 1/Group 1

E/APE # / Name / Safety Function	E/AK1	E/AK2	E/AK3	E/AA1	E/AA2	G	K/A Topic(s)	Imp.	Points
000001 Continuous Rod Withdrawal / 1					3		Actions taken if automatic functions have not taken place	4.8	1
000003 Dropped Control Rod / 1						2.4.4	Entry-level for abnormal operating procedures (Dropped Rod)	4.3	1
000005 Inoperable/Stuck Control Rod / 1			3				Tech-Spec limits for rod mismatch	4.1	1
					3		Actions if more than one rod stuck / inoperable	4.4	1
000011 Large Break LOCA / 3 **(PSA)**					11		Conditions for throttling HPI	4.3	1
W/E04 LOCA Outside Containment / 3									
W/EO1 & E02 Rediagnosis & SI Termination / 3					2		(Rediagnosis) Adherence to procedures	3.9	1
000015/17 RCP Malfunctions / 4				20			RCP malfunctions: Bearing temperature	2.7	1
W/E09&E10 Natural Circ. / 4			1				(Nat Circ) Facility operating characteristics	3.6	1
000024 Emergency Boration / 1				5			Performance of letdown system during emergency boration	3.2	1
000026 Loss of Component Cooling Water / 8					4		Limits for temps of components cooled by CCW	2.9	1
000029 Anticipated Transient w/o Scram / 1					1		ATWS: Reactor nuclear instrumentation	4.7	1
000040 (W/E12) Steam Line Rupture - Excessive Heat Transfer / 4	2						(Uncont Depress all SGs) Emergency operating procedures	3.8	1
W/E08 RCS Overcooling - PTS / 4			3				(PTS) Desired operating results during emergency situations	3.8	1
					2		(PTS) Adherence to appropriate procedures	4.1	1
000051 Loss of Condenser Vacuum / 4					2		Conditions requiring reactor and/or turbine trip	4.1	1
000055 Station Blackout / 6						2.4.16	EOP hierarchy / coordination (Station Blackout)	4.0	1
000057 Loss of Vital AC Elec. Inst. Bus / 6					20		Interlocks to restore normal equipment operation	3.9	1
000059 Accidental Liquid RadWaste Rel. / 9		2					Radioactive-gas monitors	2.7	1
000062 Loss of Nuclear Service Water / 4						2.4.24	Loss of cooling water procedures (SW)	3.7	1
000067 Plant Fire On-site / 9					4		Fire's extent of potential damage to equipment	4.3	1
000068 Control Room Evac / 8						2.4.11	Abnormal condition procedures (Cont Room Evac)	3.6	1
000069 (W/E14) Loss of CTMT Integrity / 5	2						(High Cont Press) Emergency operating procedures	3.7	1
000074 (W/E06&E07) Inad. Core Cooling / 4		2					(Core Cooling) Facility's heat removal and operation	4.1	1
000076 High Reactor Coolant Activity / 9					2		Actions for high fission product activity in RCS	3.4	1
K/A Category Totals:	2	2	3	2	11	4	Group Point Total:		24

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Emergency and Abnormal Plant Evolutions - Tier 1/Group 2

E/APE # / Name / Safety Function	E/AK1	E/AK2	E/AK3	E/AA1	E/AA2	G	K/A Topic(s)	Imp.	Points
000007 Reactor Trip - Stabilization - Recovery / 1			1				Actions contained in EOP for reactor trip	4.6	1
000008 Pressurizer Vapor Space Accident / 3									
000009 Small Break LOCA / 3									
W/E03 LOCA Cooldown - Depress. / 4 **(PSA)**				2			(LOCA CD/Depress) Operating behavior characteristics	3.9	1
W/E11 Loss of Emergency Coolant Recirc. / 4 **(PSA)**		2					Facility's heat removal systems and proper operation	4.3	2
					2		(Loss of Recirc) Adherence to procedures	4.2	
000022 Loss of Reactor Coolant Makeup / 2									
000025 Loss of RHR System / 4	1						Implications of loss of RHRS during all modes	4.3	1
						2.1.25	Interpret station reference materials (Loss of RHR)	3.1	1
000027 Pressurizer Pressure Control System					4		Tech-Spec limits for RCS pressure	4.3	1
000032 Loss of Source Range NI / 7					1		Normal/abnormal power supply operation	2.9	1
000033 Loss of Intermediate Range NI / 7					11		Loss of compensating voltage	3.4	1
000037 Steam Generator Tube Leak / 3					16		Pressure to maintain RCS during S/G cooldown	4.3	1
000038 Steam Generator Tube Rupture / 3						2.4.4	Entry-level conditions for EOPs (SGTR)	4.3	1
000054 Loss of Main Feedwater / 4 **(PSA)**	1						MFW line break depressurizes S/G (similar to steam break)	4.3	1
W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4 **(PSA)**					1		(Loss of Heat Sink) Selection of procedures	4.4	1
000058 Loss of DC Power / 6			1				Use of dc control power by D/Gs	3.7	1
000060 Accidental Gaseous Radwaste Rel. / 9									
000061 ARM System Alarms / 7			2				Guidance contained in alarm response for ARM system	3.6	1
W/E16 High Containment Radiation / 9									
000065 Loss of Instrument Air / 8					6		When to trip reactor if inst air press decreasing	4.2	1
K/A Category Totals:	2	1	3	1	7	2	Group Point Total:		16

ES-401							PWR SRO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 3		Form ES-401-3
E/APE # / Name / Safety Function	E/AK1	E/AK2	E/AK3	E/AA1	E/AA2	G	K/A Topic(s)	Imp.	Points
000028 Pressurizer Level Malfunction / 2	1						PZR reference leak abnormalities	3.1	1
000036 Fuel Handling Accident / 8						2.2.28	Fuel movement procedures (Fuel Handling Accident)	3.5	1
000056 Loss of Off-site Power / 6									
W/E13 Steam Generator Over-pressure / 4									
W/E15 Containment Flooding / 5			1				(Cont Flooding) Coolant chemistry and effects	2.9	1
K/A Category Totals:	1	0	1	0	0	1	Group Point Total:		3

Plant Systems - Tier 2/Group 1

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
001 Control Rod Drive								12				Consequences of erroneous ECP calculation	4.2	2
			1									Effect of loss/malfunction of CRDS on CVCS	3.0	
003 Reactor Coolant Pump								5				Effects of VCT pressure on RCP seal leakoff flows	2.8	1
004 Chemical and Volume Control										4		Calculation of boron concentration changes	3.6	2
							11					CVCS controls: Letdown and charging flows	3.0	
013 Engineered Safety Features Actuation										3		Operate/monitor: ESFAS initiation	4.7	2
		1										Power supplies to ESFAS/safeguards equipment	3.8	
014 Rod Position Indication								4				Consequences of misaligned rod	3.9	1
015 Nuclear Instrumentation						4						NIS: Bistables and logic circuits	3.2	1
017 In-core Temperature Monitor				1								Input to subcooling monitors	3.7	1
022 Containment Cooling			2									Effect of loss of CCS on cont instruments	3.3	1
026 Containment Spray							1					CSS controls: Containment pressure	4.2	1
056 Condensate	3											Relationships between Condensate and MFW	2.6	1
059 Main Feedwater				19								Automatic feedwater isolation	3.4	1
061 Auxiliary/Emergency Feedwater **(PSA)**											2.1.12	Apply tech specs (AFW)	4.0	1
063 DC Electrical Distribution											2.1.32	System limits and precautions (DC Electrical)	3.8	1
068 Liquid Radwaste											2.3.11	Radiation releases (Liquid Radwaste)	3.2	1
071 Waste Gas Disposal								5				WGDS: Power failure to ARM and PRM	2.6	1
072 Area Radiation Monitoring					2							Radiation intensity changes with source distance	3.2	1
K/A Category Totals:	1	1	2	2	1	1	2	4	0	2	3	Group Point Total:		19

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System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
002 Reactor Coolant					10							Relationship between reactor power and RCS diff temp	4.1	1
006 Emergency Core Cooling								12				Conditions requiring ECCS actuations	4.8	1
010 Pressurizer Pressure Control											2.1.33	Entry-level conditions for tech specs (Pressurizer Pressure)	4.0	1
011 Pressurizer Level Control						4						Effect on operation of PZR level controllers	3.1	1
012 Reactor Protection		1										Power supplies to RPS channels, components	3.3	1
016 Non-nuclear Instrumentation			1									Effect of loss of NNIS on RCS	3.6	1
027 Containment Iodine Removal														
028 Hydrogen Recombiner and Purge Control							2					HRPS controls: Containment pressure	3.7	1
029 Containment Purge														
033 Spent Fuel Pool Cooling			3									Effect of loss on spent fuel temperature	3.3	1
034 Fuel Handling Equipment														
035 Steam Generator				1								S/GS feature(s) providing for S/G level control	3.8	1
039 Main and Reheat Steam					8							Effect of steam removal on reactivity	3.6	1
055 Condenser Air Removal														
062 AC Electrical Distribution		1										Power supplies to major system loads	3.4	1
064 Emergency Diesel Generator										2		Adjustment of exciter voltage	3.4	1
073 Process Radiation Monitoring										1		Operate/monitor: Effluent release	3.9	1
075 Circulating Water								2				Consequences of loss of CW pumps	2.7	1
079 Station Air	1											Relationship between SAS and IAS	3.1	1
086 Fire Protection									1			Starting mechanisms of fire water pumps	3.3	1
103 Containment				6								Containment isolation system	3.7	1
K/A Category Totals:	1	2	2	2	2	1	1	2	1	2	1	Group Point Total:		17

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Plant Systems - Tier 2/Group 3

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
005 Residual Heat Removal														
007 Pressurizer Relief/Quench Tank									1			Components which discharge to the PRT	2.9	1
008 Component Cooling Water				2								CCWS: Operation of surge tank	3.7	1
041 Steam Dump/Turbine Bypass Control						3						SDS: Controller and positioners	2.9	1
045 Main Turbine Generator	18											Relationships between MT/G system and RPS	3.7	1
076 Service Water														
078 Instrument Air														
K/A Category Totals:	1	0	0	1	0	1	0	0	1	0	0	Group Point Total:		4

Plant-Specific Priorities

System/Topic	Recommended Replacement for ...	Reason	Points
Plant-Specific Priority Total: (limit 10)			

Facility: **RNP** Date of Exam: **26-Mar-01** Exam Level: **SRO**

Category	K/A #	Topic	Imp.	Points
Conduct of Operations	2.1.1	Conduct of operations requirements	3.8	1
	2.1.3	Shift turnover practices	3.4	1
	2.1.33	Entry-level conditions for technical specifications	4.0	1
	2.1.29	Conduct and verify valve lineups	3.3	1
	2.1.34	Maintain primary and secondary plant chemistry within limits	2.9	1
	Total			5
Equipment Control	2.2.11	Process for controlling temporary changes	3.4	1
	2.2.13	Tagging and clearance procedures	3.8	1
	2.2.18	Process for managing maintenance activities during shutdown operations	3.6	1
	2.2.26	Refueling administrative requirements	3.7	1
	Total			4
Radiation Control	2.3.2	Facility ALARA program	2.9	1
	2.3.1	10 CFR:20 and related facility radiation control requirements	3.0	1
	2.3.4	Radiation exposure limits and contamination control, including permissible levels in excess of those authorized	3.1	1
	Total			3
Emergency Procedures/ Plan	2.4.16	EOP implementation hierarchy and coordination with other support procedures.	4.0	1
	2.4.26	Facility protection requirements including fire brigade	3.3	1
	2.4.43	Emergency communications systems and techniques	3.5	1
	2.4.45	Interpret significance of each annunciator or alarm	3.6	1
	2.4.30	Events related to system operations/status which should be reported to outside agencies	3.6	1
	Total			5
Tier 3 Point Total				17

Facility: **RNP** Date of Examination: **26-Mar-01**

Examination Level: **SRO-I** Operating Test Number: ______

B.1 Control Room Systems

	System/JPM Title	Type Code*	Safety Function (KA #)
a.	Depressurize the RCS Following a SGTR (PATH-2)	MASL	3 (027AA1.01)
b.	Shift Operating CCW Pumps (OP-306)	NS	8 (008A4.01)
c.	Restore Normal Power Following a Loss of Off-Site Power (OP-603)	DSL	6 (062A4.07)
d.	Perform Emergency Boration (EPP-4)	MASL	1 (004A4.18)
e.	Manually Initiate Containment Spray (PATH-1)	DASL	5 (011EA1.04)
f.	Perform NIS Comparator Channel Surveillance (OST-007)	NS	7 (015A4.02)
g.	Transfer to Long Term Recirculation (EPP-10)	DASL	2 (006A4.05)

B.2 Facility Walk-Through

	System/JPM Title	Type Code*	Safety Function (KA #)
a.	Perform Emergency Refill of IVSW Tank Using Service Water (OP-911)	DR	5 (069AA1.03)
b.	Lineup the Deepwell Pumps as Backup to AFW System (OP-402)	D	4S (061A1.04)
c.	Remove the Halon Suppression System from Service (OP-804)	D	8 (086A4.06)

*Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (C)ontrol Room, (S)imulator, (L)ow-Power, (R)CA

Facility: **RNP**	Date of Examination: **26-Mar-01**
Examination Level: **SRO-U**	Operating Test Number:

B.1 Control Room Systems

	System/JPM Title	Type Code*	Safety Function (KA #)
a.	Depressurize the RCS Following a SGTR (PATH-2)	MASL	3 (027AA1.01)
b.	Shift Operating CCW Pumps (OP-306)	NS	8 (008A4.01)
c.			
d.	Perform Emergency Boration (EPP-4)	MASL	1 (004A4.18)
e.			
f.			
g.			

B.2 Facility Walk-Through

	System/JPM Title	Type Code*	Safety Function (KA #)
a.	Perform Emergency Refill of IVSW Tank Using Service Water (OP-911)	DR	5 (069AA1.03)
b.	Lineup the Deepwell Pumps as Backup to AFW System (OP-402)	D	4S (061A1.04)
c.			

*Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (C)ontrol Room, (S)imulator, (L)ow-Power, (R)CA

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM COM-B.1.a

Depressurize the RCS Following a SGTR (PATH-2)

CANDIDATE: ______________________________

EXAMINER: ______________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task: Depressurize the RCS Following a SGTR (PATH-2)

Alternate Path: PORV fails to close following depressurization, requiring block valve to be closed

Facility JPM #: CR082 (Modified)

K/A Rating: 027AA1.01 Importance: SRO 4.0 RO 3.9

K/A Statement: Ability to operate and / or monitor the following as they apply to the Pressurizer Pressure Control Malfunctions: PZR heaters, sprays, and PORVs

Task Standard: Failed open PZR PORV has been isolated by closed PORV Block Valve.

Preferred Evaluation Location: Simulator X In Plant ____

Preferred Evaluation Method: Perform X Simulate ____

References: PATH-2

Validation Time: 15 minutes Time Critical: NO

Candidate: ____________________

Time Start: ________ Time Finish: ________

Performance Time: ________ minutes

Performance Rating: SAT ________ UNSAT ________

Comments: ____________________

____

Examiner: ____________________ Date: ________
Signature

Tools/Equipment/Procedures Needed:

PATH-2

SIMULATOR OPERATOR INSTRUCTIONS:

1) Reset to any 100% power IC.
2) Insert MFI SGN02B at 400 gpm
3) Carry out actions of PATH-1 and PATH-2 until step D-9 is reached.
4) Ensure ALL RCPs are secured.
5) FREEZE the simulator.
6) WHEN DIRECTED by JPM instructions, insert overrides to cause PZR PORV 456(455C) to fail open when placed in OPEN position.

READ TO OPERATOR

DIRECTION TO CANDIDATE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

A SGTR has occurred in SG 'B'.

Following a reactor trip and safety injection, actions have been taken in accordance with PATH-1 and PATH-2. RCS Subcooling has just been determined to be > 55 °F following the RCS cooldown to the required temperature.

INITIATING CUES:

You are directed to depressurize the RCS to less than SG pressure commencing with Step D-9 (NORMAL SPRAY AVAILABLE) in PATH-2.

START TIME: ________

STEP 1:	Locates proper procedure and required information.	
STANDARD:	Locates current copy of PATH-2	
NOTES:	***NOTE: SRO procedure reader will provide reading of steps.***	____ SAT
COMMENTS:		____ UNSAT

STEP 2:	Normal Spray Available?	
STANDARD:	**<NO>** - Determines Normal Spray is NOT available by checking RCPs all stopped	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 3: <u>NOTE</u>: Rapid PZR level increase will occur due to voiding during depressurization if RCPs not running STANDARD: Acknowledges NOTE NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 4: At least one PZR PORV available? STANDARD: **<YES>** - Determines both PORVs are available by indicating lights and block valve available / open NOTES: COMMENTS:	____ SAT ____ UNSAT

STEP 5:	PZR level greater than 71%?	
STANDARD:	**<NO>** - Determines PZR level is less than 71% by level indications	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
STEP 6:	Ruptured SG press greater than RCS pressure?	
STANDARD:	**<NO>** - Determines SG 'B' pressure is less than RCS pressure by comparision of pressure indications	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 7:	<u>WHEN</u> PZR level greater than 10%, <u>THEN</u> reduce charging flow to minimum.	**CRITICAL STEP**
STANDARD:	Reduces charging flow to minimum by placing charging pump controller in MANUAL and lowering pump speed to MINIMUM flow	
NOTES:	**CRITICAL TO MINIMIZE LIKELIHOOD OF PZR OVERFILL.** ***NOTES:*** ***1) This is a CONTINUOUS action step.*** ***2) Critical to place at minimum speed after 10% level is met and before attempt is made to close the open PORV.***	____ SAT
COMMENTS:		____ UNSAT

STEP 8:	RCS Subcooling greater than 35 °F?	
STANDARD:	**<YES>** Determines RCS subcooling is greater than 35 °F by subcooling monitor indications	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 9:	Minimize cycling of PZR PORVs to prevent adverse CV conditions due to PRT ruptures	
STANDARD:	Recognizes that cycling of PZR PORVs should be minimized	
NOTES:	***NOTE: The PORV will fail open when control switch placed in OPEN, so this step is NA.***	____ SAT
COMMENTS:		____ UNSAT
STEP 10:	Open one PZR PORV to depressure RCS	**CRITICAL STEP**
STANDARD:	Places PZR PORV PCV-456(455C) in OPEN position and verifies valve opens by position indication	
NOTES:	**CRITICAL TO DEPRESSURIZE THE RCS BELOW SG PRESSURE.**	____ SAT
COMMENTS:		____ UNSAT
	SIMULATOR OPERATOR INSTRUCTIONS: Insert overrides, as applicable, when PZR PORV 456(455C) placed in OPEN position.	

STEP 11: Attempts to close the previously opened PORV when criteria met STANDARD: Places PZR PORV PCV-456(455C) in CLOSE position when either PZR level greater than 71% **OR** Ruptured S/G pressure greater than RCS pressure with PZR level greater than 10% **OR** RCS subcooling less than 35 °F NOTES: ***NOTE: The PORV is failed open and will NOT close.*** COMMENTS:	____ SAT ____ UNSAT
STEP 12: Verify PZR PORV closed STANDARD: Determines previously opened PZR PORV is still open by position indication NOTES: COMMENTS:	____ SAT ____ UNSAT

STEP 13:	RCS pressure increasing?	
STANDARD:	**<NO>** - Determines RCS pressure still decreasing by pressure indication	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 14:	Close PORV Blocks	**CRITICAL STEP**
STANDARD:	Places control switch for applicable PORV Block, RC-535(536) in CLOSE position and verifies valve closed by position indication	
NOTES:	**CRITICAL TO STOP DEPRESSURIZATION OF RCS.**	____ SAT
COMMENTS:		____ UNSAT

STEP 15:	RCS pressure increasing?	
STANDARD:	**<YES>** - Determines RCS pressure increasing by pressure indication	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
	END OF TASK	

STOP TIME: ________

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

A SGTR has occurred in SG 'B'.

Following a reactor trip and safety injection, actions have been taken in accordance with PATH-1 and PATH-2. RCS Subcooling has just been determined to be > 55 °F following the RCS cooldown to the required temperature.

INITIATING CUES:

You are directed to depressurize the RCS to less than SG pressure commencing with Step D-9 (NORMAL SPRAY AVAILABLE) in PATH-2.

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM COM-B.1.b

Shift Operating CCW Pumps (OP-306)

CANDIDATE: ______________________________

EXAMINER: ______________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task: Shift Operating CCW Pumps (OP-306)

Alternate Path: NONE

Facility JPM #: NEW

K/A Rating: 008A4.01 Importance: SRO 3.3 RO 3.1

K/A Statement: Ability to manually operate and/or monitor in the control room: CCW indications and controls

Task Standard: CCW Pump 'B' has been started and CCW Pump 'A' has been stopped.

Preferred Evaluation Location: Simulator X In Plant ______

Preferred Evaluation Method: Perform X Simulate ______

References: OP-306, Component Cooling Water System

Validation Time: 10 minutes Time Critical: NO

Candidate: ______________________________

Time Start: ________ Time Finish: ______

Performance Time: ______ minutes

Performance Rating: SAT ______ UNSAT ______

Comments: ______________________________

____

Examiner: ______________________________ Date: ______
Signature

Tools/Equipment/Procedures Needed:

OP-306

SIMULATOR OPERATOR INSTRUCTIONS:

1) RESET to IC-204.

2) Ensure CCW Pump 'A' is running with CCW Pump 'B' in standby.

3) FREEZE the simulator.

READ TO OPERATOR

DIRECTION TO CANDIDATE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

The plant is operting at 100% power.

CCW Pump 'A' is in service. CCW Pump 'B' has NOT been operated within the last 24 hours.

OP-306, "Component Cooling Water System," Attachment 10.4, "CCW Pump B Prestart Checklist," has been completed.

INITIATING CUES:

You are to place CCW Pump 'B' in service and secure CCW Pump 'A' in accordance with OP-306, Section 8.2.1.

START TIME: ________

STEP 1: Locates proper procedure and required information STANDARD: Locates OP-306, Section 8.2.1 NOTES: ***NOTE: SRO procedure reader will provide reading of steps due to requiring 2-hand operation for performance of JPM.*** COMMENTS:	____ SAT ____ UNSAT
STEP 2: IF a CCW Pump is to be started, THEN perform the following to start the selected CCW Pump: b. IF CCW PUMP 'B' is to be started, THEN verify Attachment 10.4 is complete (**Step 8.2.1.2.b**) STANDARD: Verifies Attachment 10.4 complete NOTES: ***NOTE: Initial conditions provide information that Attachment is complete.*** COMMENTS:	____ SAT ____ UNSAT

STEP 3:	Start the selected CCW Pump (**Step 8.2.1.2.d**)	**CRITICAL STEP**
STANDARD:	Places switch for CCW Pump 'B' in START position and verifies pump starts by breaker indication and flow indication on FI-613	
NOTES:	**CRITICAL TO ALLOW STARTING CCW PUMP 'B'.**	____ SAT
COMMENTS:		____ UNSAT
STEP 4:	IF a CCW Pump is to be stopped, THEN perform the following to stop the selected CCW Pump: a. Place AND hold the handswitch for any non-operating pump(s) to the STOP position (**Step 8.2.1.3.a**)	**CRITICAL STEP**
STANDARD:	Places and holds switch for CCW Pump 'C' in STOP position	
NOTES:	**CRITICAL TO PREVENT STARTING CCW PUMP 'C' ON LOW DISCHARGE PRESSURE WHEN CCW PUMP 'A' IS STOPPED.**	____ SAT
COMMENTS:		____ UNSAT

STEP 5:	Stop the selected CCW Pump (**Step 8.1.2.3.b**)	**CRITICAL STEP**
STANDARD:	Places switch for CCW Pump 'A' in STOP position and verifies pump stops by breaker and flow indication	
NOTES:	**CRITICAL TO STOP CCW PUMP 'A' TO PROVIDE REQUIRED ALIGNMENT.**	____ SAT
COMMENTS:		____ UNSAT
STEP 6:	Verify APP-001-F5, CCW PMP LO PRESS alarm EXTINGUISHED (**Step 8.1.2.3.c**)	
STANDARD:	Determines APP-001-F5 extinguished after alarming	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 7:	NOTE: Receiving APP-001-F5 at any time when the handswitch for a non-operating CCW Pump was being held in the STOP position will require resetting the applicable CCW Pump(s) lockout to allow for auto start on low CCW pressure (**Note before Step 8.1.2.3.d**)	
STANDARD:	Acknowledges note	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
STEP 8:	IF APP-001-F5 is extinguished, THEN release the handswitch for any non-operating pump(s) to the AUTO position (**Step 8.1.2.3.d**)	
STANDARD:	Releases handswitch for CCW Pump 'C' to AUTO position	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 9:	NOTE: In MODES 1, 2, 3, and 4, two CCW trains powered from emergency power supplies shall be OPERABLE as identified in ITS LCO 3.7.6. In MODES 5 or 6, the OPERABILITY requirements of the CCW System are determined by the systems it supports. (**Note before Step 8.1.2.3.e**)	
STANDARD:	Acknowledges note	
NOTES:		
COMMENTS:		____ SAT ____ UNSAT
STEP 10:	IF APP-001-F5 will not reset, THEN perform the following: (**Step 8.2.1.3.e**) 1) Restart the CCW pump stopped in Step 8.2.1.3.b. 2) IF a CCW Pump had just been started in Step 8.2.1.2.d, THEN perform the following: a) Stop the CCW pump started in Step 8.2.1.2.d b) Declare CCW pump just stopped out of service c) IF Tech. Spec. Required Action Statement has been entered, THEN inform SSO/CRSS AND record time 3) Investigate pumps for source of problem	
STANDARD:	Determines alarm reset following receipt of alarm and N/As step	
NOTES:		
COMMENTS:		____ SAT ____ UNSAT

STEP 11:	NOTE: The CCW Pump auto start on low pressure will be locked in if a low pressure alarm is received while the handswitch is held in the STOP position. Pump lockout will not reset if the CCW low pressure alarm is present. (**Note before Step 8.2.1.3.f**)	
STANDARD:	Acknowledges note	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
STEP 12:	If APP-001-F5, CCW PMP LO PRESS, alarm is received while a CCW Pump handswitch is held in the STOP position AND the CCW Pump is to remain in standby, THEN perform the following to reset the low pressure auto start lockout for the applicable pump(s): 1) IF Tech. Spec. Required Action Statement will be entered when the CCW Pump(s) control power fuses are removed, THEN inform SSO/CRSS AND record time (**Step 8.2.1.3.f.1**)	
STANDARD:	Informs SSO/CRSS of Tech Spec	
NOTES:	***NOTE: Candidate may defer this declaration to CRSS.*** ***CUE: SSO/CRSS acknowledges report.***	____ SAT
COMMENTS:		____ UNSAT

STEP 13: Remove the control power fuse(s) (**Step 8.2.1.3.f.2**) STANDARD: Directs local operator to remove control power fuses for CCW Pump 'C' ***SIMULATOR OPERATOR INSTRUCTIONS: Simulate removing control power fuses for CCW Pump 'C' by racking out breaker.*** NOTES: ***CUE: Auxiliary Operator reports fuses are removed (when breaker racked out).*** COMMENTS:	____ SAT ____ UNSAT
STEP 14: Place AND hold the handswitch in the STOP position (**Step 8.2.1.3.f.3**) STANDARD: Places and holds control switch for CCW Pump 'C' to STOP position NOTES: ***NOTE: This is to prevent start of the CCW pump in the event of a low pressure condition upon reinserting fuses.*** COMMENTS:	____ SAT ____ UNSAT

STEP 15:	Install the control power fuse(s) (**Step 8.2.1.3.f.4**)	
STANDARD:	Directs local operator to install control power fuses for CCW Pump 'C' ***SIMULATOR OPERATOR INSTRUCTIONS: Simulate installing control power fuses for CCW Pump 'C' by racking in breaker.***	
NOTES:	***CUE: Auxiliary Operator reports fuses are installed (when breaker racked in).***	____ SAT
COMMENTS:		____ UNSAT
STEP 16:	Release the handswitch (**Step 8.2.1.3.f.5**)	
STANDARD:	Releases control switch for CCW Pump 'C' to AUTO position	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 17: NOTE: There is no need to start the pump to ensure proper operation if indication is correct on the RTGB. (**Note before Step 8.2.1.3.f.6**) STANDARD: Acknowledges note NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 18: Verify proper CCW Pump indication on the RTGB to ensure control power fuse(s) are installed properly (**Step 8.2.1.3.f.6**) STANDARD: Verifies proper indication for CCW Pump 'C' (green light illuminated) NOTES: COMMENTS:	____ SAT ____ UNSAT

STEP 19: Repeat steps 8.2.1.3.f.2 through 8.2.1.3.f.6 for affected pumps (N/A steps for unaffected pumps) (**Step 8.2.1.3.f.7**) STANDARD: Determines only CCW Pump 'C' affected and N/As steps for CCW Pumps 'A' and 'B' NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 20: IF Tech. Spec. Required Action Statement has been exited, THEN inform SSO/CRSS AND record time (**Step 8.2.1.3.f.8**) STANDARD: Informs SSO/CRSS and records time NOTES: ***CUE: SSO/CRSS acknowledges information.*** COMMENTS: ***END OF TASK***	____ SAT ____ UNSAT

STOP TIME: ________

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

The plant is operting at 100% power.

CCW Pump 'A' is in service. CCW Pump 'B' has NOT been operated within the last 24 hours.

OP-306, "Component Cooling Water System," Attachment 10.4, "CCW Pump B Prestart Checklist," has been completed.

INITIATING CUES:

You are to place CCW Pump 'B' in service and secure CCW Pump 'A' in accordance with OP-306, Section 8.2.1.

CP&L

M
Multiple Use

CAROLINA POWER & LIGHT COMPANY
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 3
PART 2

OPERATING PROCEDURE

OP-306

COMPONENT COOLING WATER SYSTEM

REVISION 32

SUMMARY OF CHANGES
DCF 2000P1000

STEP/PAGE	REVISION COMMENTS
NOTE prior to 8.2.1.3.d	Added note to inform operator if a low pressure alarm was received any time when the pump switch is being held to stop, the lockout feature will need to be reset for the affected pump.
8.2.1.3.d	Changed “remained extinguished” to “is extinguished” based on OPCF comment. Applicable steps in this section direct resetting of the pump lockout feature if the alarm was received any time the switch was in the stop position.
8.2.1.3.f	Revised substeps to provide sign off blanks for resetting the lockout feature for each CCW Pump. OPCF comment.

TABLE OF CONTENTS

1.0 **PURPOSE**

1.1 This procedure provides the Startup and Infrequent operation procedures for operation of the Component Cooling Water System.

2.0 **REFERENCES**

2.1 Improved Technical Specifications LCO 3.7.6

2.2 Updated FSAR Section - 9.2.2

2.3 SD-013, Component Cooling Water System

2.4 5379-376, Component Cooling Water System

2.5 OP-601, DC Supply

2.6 OP-603, Electrical Distribution

2.7 OP-903, Service Water System

2.8 OP-915, Demineralized and Primary Water

2.9 OP-920, Radiation Monitoring

2.10 EE 93-109, Operation with CCW at 125 °F

2.11 ACR 92-325, Starting Duty of Major Plant Motors

2.12 NED-G-8754, Memo from G.E. Attarian to T.P. Cleary on Testing of Component Cooling Pump Auto-Start Function

2.13 CR 95-00565, Water Hammer Events and RHR Isolation Event

2.14 CR 95-01353, Pump not Vented After Maintenance

2.15 PLP-037, Conduct of Infrequently Performed Tests or Evolutions

2.16 ESR 9501117, Guidance for Maximum CCW Header pressure

2.17 Response to R87-038/OOA-DI-A500, CCW Flow and Temperature Limitations.

2.18 CR 98-00108, Air Entrainment in CCW System During Pump Venting.

2.19 OPS-NGGC-1303, Independent Verification

3.0 RESPONSIBILITIES

N/A

4.0 PREREQUISITES

4.1 Service water flow is established through the tube side of the Component Cooling Heat Exchanger to be placed in service IAW OP-903.

4.2 Dedicated Shutdown Bus, E-1, E-2, MCC-5 and MCC-6 are energized IAW OP-603.

4.3 125VDC Control Power is available IAW OP-601.

4.4 Component Cooling Water Radioactive Liquid Monitor, R-17, is in service IAW OP-920.

5.0 PRECAUTIONS AND LIMITATIONS

5.1 In MODES 1, 2, 3, and 4, two CCW trains powered from emergency power supplies shall be OPERABLE as identified in ITS LCO 3.7.6.

5.2 In MODES 5 or 6, the OPERABILITY requirements of the CCW System are determined by the systems it supports.

5.3 When RCS temperature is greater than 350 °F, the CCW Heat Exchanger outlet temperature, as indicated on TI-607, CCW HX OUTLET TEMPERATURE, should not exceed 105 °F to ensure CCW component maximum temperatures are not exceeded.

5.4 During normal cooldown, when the RCS temperature is less than or equal to 350 °F, the CCW Heat Exchanger outlet temperature, as indicated on TI-607, should not exceed 125 °F, to ensure CCW component maximum temperatures are not exceeded. However, the CCW temperature limit of 105 °F applies to the operation of the following components regardless of RCS temperature:

- Post Accident Sampling Heat Exchanger
- Excess Letdown Heat Exchanger

5.5 Leave CC-739, EXCESS LTDN HX OUTLET open. If this valve is closed, and a second CCW Pump starts, the Safety may lift, putting CCW in the Reactor Sump.

5.6 Upon a Containment Phase "A" Isolation Signal, CC-739, EXCESS LTDN HX OUTLET will close. Following a reset of the Containment Phase "A" Isolation Signal, CC-739 will not automatically re-open. If desired to re-open CC-739, the Control Switch on the RTGB shall be placed in the OPEN position.

5.7 The minimum flow for the Component Cooling Water Pumps during <u>continuous</u> operation should not be less than 2200 gpm <u>per pump</u>. When starting a pump, sufficient Component Cooling circuits to satisfy the minimum flow requirement should be in service.

5.8 Initiation of cooling water flow to a component may result in a reduction of cooling water flow to the other components in the system. After initiating flow to the new component, the flow rates to the other components shall be checked and adjusted if necessary.

5.9 Normally, the flow control valves are to be used for flow adjustments and should not be used for line isolation.

5.10 CCW Header pressure should be maintained below 110 psig to prevent CCW Pump seal damage. Brief operation above 110 psig while shifting pumps is acceptable. (ESR 9501117)

5.11 The final adjustment of the hand flow control valves shall be made after the loop has been at normal operating temperatures for a sufficient length of time for temperature stabilization.

5.12 During normal plant operation, adequate cooling is provided by one Component Cooling Heat Exchanger and one Component Cooling Pump. When operation of the Residual Heat Removal loop is initiated, both Component Cooling Heat Exchangers and two Component Cooling Pumps should be in operation.

5.13 If the shell side of a CCW Heat Exchanger is isolated with CCW temperature greater than 105°F **OR** Service Water temperature less than 60 °F, then the shell side of the heat exchanger should be vented to prevent a low pressure condition from developing and damaging the heat exchanger.

5.14 Care shall be exercised in handling the treated Component Cooling Water as it is a mildly toxic liquid.

5.15 To prevent boiling the CCW liquid in an RHR HX, CCW flow should not be isolated to an RHR HX when the temperature of the RHR System is greater than 200°F. (CR 95-00565)

5.16 A pump start is any time the motor windings are energized as a result of breaker operation. The Component Cooling Water Pump starting limitations are as follows (The flowchart below should aid in determining if the pump should be started): (ACR # 92-325)

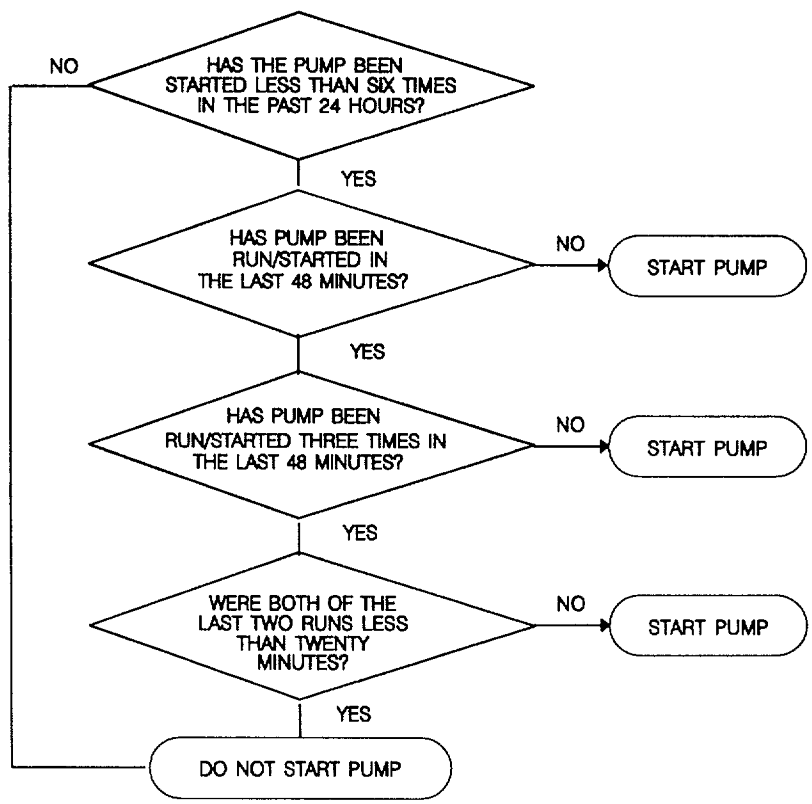
5.16.1 **IF** the pump has not been run in the last 48 minutes, **THEN** 3 consecutive starts are allowed.

5.16.2 **IF** the pump has been started 3 times in the last 48 minutes **AND** neither of the last 2 starts was a run of at least 20 minutes, **THEN** no further starts are allowed for 48 minutes.

1. Any run in the previous 48 minutes is considered one of the 3 allowed starts.

5.16.3 **IF** the pump was run at least 20 minutes and stopped, **THEN** 2 consecutive starts are allowed with no waiting period.

5.16.4 Maximum of six starts per day.



5.17 CCW temperature limits for RCP start and continued operation are as follows:

- When RCS Cold Leg temperature is less than or equal to 350 °F, the allowable CCW Heat Exchanger Outlet temperature range is 44°F to 125°F.
- When RCS Cold Leg temperature is greater than 350 °F **AND** less than or equal to 475°F, the allowable CCW Heat Exchanger Outlet temperature range is 44°F to 105°F.
- When RCS Cold Leg temperature is greater than 475 °F, the allowable CCW Heat Exchanger Outlet temperature range is 45 °F to 105°F.

5.18 Because of chromates in the Component Cooling Water, water drained from the Component Cooling Loop shall not be discharged into the Storm Sewers or Ground Water.

5.19 The Component Cooling Loop is designed on the basis that the following Component Cooling Water Chemistry is maintained.

5.19.1 Corrosion Inhibitor K_2CrO_4 or $K_2Cr_2O_7$

1. 1000 ppm (CrO_4) for first week
2. After filling system, 175-225 ppm (CrO_4)thereafter

5.19.2 pH at 77°F 8.0 to 9.0

5.19.3 Chloride ppm maximum 0.15 ppm

5.20 The principles of **ALARA** shall be used in planning and performing work and operations in the Radiation Control Area.

5.21 The following rules apply concerning lockout of the low pressure auto start on the CCW Pumps:

5.21.1 **IF** a CCW Pump handswitch is being held in the STOP position **AND** a low pressure alarm is received, **THEN** that pump will be locked out from an auto start on low pressure. There is no time delay associated with this feature. This should be remembered when shifting CCW Pumps.

5.21.2 A low pressure auto start lockout can be reset by either of the following methods:

- Starting the pump

- Removing and reinstalling the control power fuses

5.21.3 Resetting of the low pressure alarm will not reset the pump lockout.

5.21.4 The CCW pump auto start on a blackout signal is not affected by the low pressure lockout.

5.22 The maximum recommended CCW flow through an individual CCW HX is 9200 gpm and through the SFP HX is 2350 gpm to minimize the potential for tube vibration.

5.23 When drawing an oil sample from a CCW Pump, remove the Control Power Fuses. Reinstall the Control Power Fuses when sampling has been completed **AND** the oil reservoir has been refilled to the normal level. During the interval the Fuses are removed, the CCW Pump is inoperable.

5.24 This procedure has been screened in accordance with PLP-037 criteria and determined to be outside the bounds of an Infrequently Performed Test or Evolution.

6.0 SPECIAL TOOLS AND EQUIPMENT

N/A

7.0 ACCEPTANCE CRITERIA

N/A

INIT

8.2 Normal Operation

8.2.1 Operating CCW Pumps

1. This revision has been verified to be the latest revision available.

Name (Print)	Initial	Signature	Date

2. **IF** a CCW Pump is to be started, **THEN** perform the following to start the selected CCW Pump:

   a. **IF** CCW PUMP "A" is to be started, **THEN** verify Attachment 10.3 is complete. ____

   b. **IF** CCW PUMP "B" is to be started, **THEN** verify Attachment 10.4 is complete. ____

   c. **IF** CCW PUMP "C" is to be started, **THEN** verify Attachment 10.5 is complete. ____

   d. Start the selected CCW Pump. ____

3. **IF** a CCW Pump is to be stopped, **THEN** perform the following to stop the selected CCW Pump:

   a. Place **AND** hold the handswitch for any non-operating pump(s) to the STOP position. ____

   b. Stop the selected CCW Pump. ____

   c. Verify APP-001-F5, CCW PMP LO PRESS alarm EXTINGUISHED. ____

8.2.1.3 (Continued) INIT

> **NOTE:** Receiving APP-001-F5 at any time when the handswitch for a non-operating CCW Pump was being held in the STOP position will require resetting the applicable CCW Pump(s) lockout to allow for auto start on low CCW pressure.

d. **IF** APP-001-F5 is extinguished, **THEN** release the handswitch for any non-operating pump(s) to the AUTO position. ____

> **NOTE:** In MODES 1, 2, 3, and 4, two CCW trains powered from emergency power supplies shall be OPERABLE as identified in ITS LCO 3.7.6.
>
> In MODES 5 or 6, the OPERABILITY requirements of the CCW System are determined by the systems it supports.

e. **IF** APP-001-F5 will not reset, **THEN** perform the following:

1) Restart the CCW pump stopped in Step 8.2.1.3.b. ____

2) **IF** a CCW Pump had just been started in Step 8.2.1.2.d, **THEN** perform the following:

.a) Stop the CCW pump started in Step 8.2.1.2.d. ____

.b) Declare CCW pump just stopped out of service. ____

.c) **IF** Tech. Spec. Required Action Statement has been entered, **THEN** inform SSO/CRSS **AND** record time.
Time ________ ____

3) Investigate pumps for source of problem. ____

8.2.1.3 (Continued)

INIT

> **NOTE:** The CCW Pump auto start on low pressure will be locked out if a low pressure alarm is received while the handswitch is held in the STOP position.
>
> Pump lockout will not reset if the CCW low pressure alarm is present.

f. **IF** APP-001-F5, CCW PMP LO PRESS, alarm is received while a CCW Pump handswitch is in the STOP position **AND** the CCW Pump is to remain in standby, **THEN** perform the following to reset the low pressure auto start lockout for the applicable pump(s):

1) **IF** Tech. Spec. Required Action Statement will be entered when the CCW Pump(s) control power fuses are removed, **THEN** inform SSO/CRSS **AND** record time.

Time ________ ____

	A-Pp	B-Pp	C-Pp
2) Remove the control power fuse(s).	____	____	____
3) Place **AND** hold the handswitch in the STOP position.	____	____	____
4) Install control power fuse(s).	____	____	____
5) Release the handswitch.	____	____	____

8.2.1.3.f (Continued) INIT

NOTE: There is no need to start the pump to ensure proper operation if indication is correct on the RTGB.

		A-Pp	B-Pp	C-Pp
6)	Verify proper CCW Pump indication on the RTGB to ensure control power fuse(s) are installed properly.	____	____	____
7)	Repeat steps 8.2.1.3.f.2 through 8.2.1.3.f.6 for affected pumps (N/A steps for unaffected pumps).			____
8)	**IF** Tech. Spec. Required Action Statement has been exited, **THEN** inform SSO/CRSS **AND** record time.	Time	________	____

	Initials	Name (Print)	Date
Performed By:	______	____________________	____
	______	____________________	____
	______	____________________	____

Approved By: ____________________ ____
Superintendent Shift Operations Date

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM SRO-B.1.c

Restore Normal Power Following a Loss of Off-Site Power (OP-603)

CANDIDATE: ______________________________

EXAMINER: ______________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task: Restore Normal Power Following a Loss of Off-Site Power (OP-603)

Alternate Path: NONE

Facility JPM #: CR-028

K/A Rating: 062A4.07 Importance: SRO 3.1 RO NA

K/A Statement: Ability to manually operate and/or monitor in the control room: Synchronizing and paralleling of different AC supplies

Task Standard: Startup transformer is supplying power to on-site distribution system with EDGs still supplying E-1 and E-2 buses.

Preferred Evaluation Location: Simulator X In Plant ____

Preferred Evaluation Method: Perform X Simulate ____

References: OP-603, Electrical Distribution

Validation Time: 15 minutes Time Critical: NO

Candidate: ____________________

Time Start: ________ Time Finish: ________

Performance Time: ________ minutes

Performance Rating: SAT ________ UNSAT ________

Comments: ____________________

____

Examiner: ____________________ Date: ________
Signature

Tools/Equipment/Procedures Needed:

OP-603

SIMULATOR OPERATOR INSTRUCTIONS: Refer to Next Page, "SIMULATOR SETUP INSTRUCTIONS".

READ TO OPERATOR

DIRECTION TO CANDIDATE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

A fault occurred on the line to the Startup Transformer, causing a Loss Of Off-Site Power. Subsequently, the reactor tripped.

'A' and 'B' EDGs started and have operated as required.

PATH-1 and EPP-4, "Reactor Trip Response," actions are complete, with the plant in a stable condition.

The line to the Startup Transformer has been repaired and the initial conditions of OP-603, "Electrical Distribution," Section 8.1.1 (steps 8.1.1.1 thru 8.1.10) have been completed.

INITIATING CUES:

You are to perform OP-603, Section 8.1, starting with step 8.1.2.1 for the restoration of normal power following the loss of the startup transformer up to, but not including, the removal of the EDGs from service.

SIMULATOR SETUP INSTRUCTIONS

1) Reset simulator to IC-5.
2) Trip the Reactor.
3) Trip the turbine.
4) Insert MFI EPS-13 (None 0 0) Loss of Startup Transformer.
5) Perform actions required in PATH-1, and EPP-4.
6) Delete malfunction EPS-13.
7) Insert RFI EPS035(None 0 0) CLOSED to set "Auto Closure to 115KV SWYD BKRS.
8) RFI EPS038(None 0 0) CLOSED to set "Auto Closure to 115KV SWYD BKRS.
9) Verify all actions of OP-603, Section 8.1.1, have been completed.
10) FREEZE the simulator.

START TIME: ________

STEP 1: Locates proper procedure and required information. STANDARD: Locates OP-603, Section8.1.2 NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 2: CAUTION: All breakers shall be set up in normal operating position except breakers that tripped on low voltage, or are racked out per 8.1.1.7 (**Caution before Step 8.1.2.1**) STANDARD: Acknowledges caution NOTES: COMMENTS:	____ SAT ____ UNSAT

STEP 3:	Verify the following relays are RESET, on the Generator Protection Relay Panel in the Control Room: a. Generator Lockout Relay 86P b. Generator Back-up Lockout Relay 86BU (**Step 8.1.2.1**)	**CRITICAL STEP**
STANDARD:	Places 86P in RESET position and ensures both relays are reset by switch being in vertical position and orange light energized	
NOTES:	**CRITICAL TO ENSURE 4 KV BREAKER OPERATION DOES NOT OCCUR INADVERTANTLY.**	____ SAT
COMMENTS:		____ UNSAT
STEP 4:	CAUTION: The length of time the Startup Transformer is energized without cooling fans running shall be minimized to prevent overheating and possible damage to the transformer. Without cooling fans the transformer can be maintained at rated voltage for 6 hours at no load without causing any damage (**Caution before Step 8.1.2.2**)	
STANDARD:	Acknowledges caution	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 5:	Close the LINE DISCONNECT SWITCH (Motor Operated Disconnect) AND verify the START UP TRANSF ENERGIZED white light ILLUMINATED (**Step 8.1.2.2**)	**CRITICAL STEP**
STANDARD:	Places switch for disconnect in CLOSE position and verifies closed by white light energized	
NOTES:	**CRITICAL TO PROVIDE POWER TO BUSES.**	____ SAT
COMMENTS:		____ UNSAT
STEP 6:	NOTE: When energizing a dead bus, the synchroscope will not come to the 12 o'clock position until after the breaker is closed and the dead bus is energized (**Note before Step 8.1.2.3**)	
STANDARD:	Acknowledges note	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 7:	Insert key into STARTUP TRANSF synchroscope switch AND turn switch to STARTUP BUS 2 position (**Step 8.1.2.3**)	**CRITICAL STEP**
STANDARD:	Inserts key and rotates switch to STARTUP BUS 2 position	
NOTES:	**CRITICAL TO ALLOW CLOSURE OF BREAKER.**	____ SAT
COMMENTS:		____ UNSAT
STEP 8:	Close START-UP TO 4KV BUS 2 BKR 52/12 (**Step 8.1.2.4**)	**CRITICAL STEP**
STANDARD:	Places breaker to CLOSE position and verifies closed by breaker indication	
NOTES:	**CRITICAL TO PROVIDE POWER TO BUS.**	____ SAT
COMMENTS:		____ UNSAT

STEP 9:	Turn synchroscope key switch to the MID-POSITION (**Step 8.1.2.5**)	
STANDARD:	Key switch for synchroscope rotated to MID position	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
STEP 10:	Insert key into 4KV TIES synchroscope switch AND turn switch to BUS 1 & 2 position (**Step 8.1.2.6**)	
STANDARD:	Inserts key and rotates switch to BUS 1 & 2 position	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 11: Verify CLOSED 4KV BUS 1-2 TIE BKR 52/10 (**Step 8.1.2.7**) STANDARD: Verifies breaker closed by breaker indication NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 12: Turn synchroscope key switch to MID-POSITION (**Step 8.1.2.8**) STANDARD: Key switch for synchroscope rotated to MID position NOTES: COMMENTS:	____ SAT ____ UNSAT

STEP 13:	Locally verify STATION SERVICE TRANSFORMER 2B BKR 52/4 CLOSED (**Step 8.1.2.9**)	
STANDARD:	Directs local operator to verify breaker closed	
NOTES:	***CUE: AUXILIARY OPERATOR REPORTS BREAKER 52/4 IS CLOSED.***	____ SAT
COMMENTS:		____ UNSAT

STEP 14:	Close 480V BUS 2B MAIN BKR 52/9B (**Step 8.1.2.10**)	**CRITICAL STEP**
STANDARD:	Places switch for breaker 52/9B to CLOSE position and verifies breaker closes by breaker indication	
NOTES:	**CRITICAL TO RESTORE POWER TO BUS.**	____ SAT
COMMENTS:		____ UNSAT

STEP 15:	Verify Startup Transformer cooling fans and oil pumps OPERATING (**Step 8.1.2.11**)	
STANDARD:	Directs local operator to verify cooling fans and oil pump operating	
	SIMULATOR OPERATOR INSTRUCTIONS: When contacted to verify Startup Transformer cooling fans and oil pumps operating, enter RFI EPS331 to RESET the STARTUP TRANSFORMER TROUBLE ANNUNCIATOR (APP-009-C7) and report that fans and pumps are now running.	
NOTES:	***CUE: WHEN ACTIONS TAKEN, INFORM CANDIDATE THAT FANS AND OIL PUMPS ARE RUNNING.***	____ SAT
COMMENTS:		____ UNSAT
STEP 16:	Verify APP-009-C7, SU TRANSF TROUBLE, EXTINGUISHED (**Step 8.1.2.12**)	
STANDARD:	Verifies annunciator APP-009-C7 is extinguished.	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 17:	Close 480V BUS 2A MAIN BKR 52/8B (**Step 8.1.2.13**)	**CRITICAL STEP**
STANDARD:	Places breaker in CLOSE position and verifies closed by breaker indication	
NOTES:	**CRITICAL TO PROVIDE POWER TO BUS.**	____ SAT
COMMENTS:		____ UNSAT
STEP 18:	Insert key into STARTUP TRANSF synchroscope switch AND turn switch to STARTUP BUS 3 position (**Step 8.1.2.14**)	**CRITICAL STEP**
STANDARD:	Inserts key and rotates switch to STARTUP BUS 3 position	
NOTES:	**CRITICAL TO ALLOW BREAKER OPERATION.**	____ SAT
COMMENTS:		____ UNSAT

STEP 19:	Close START-UP TRANSFORMER TO 4KV BUS 3 BKR 52/17 (**Step 8.1.2.15**)	**CRITICAL STEP**
STANDARD:	Places switch for breaker 52/17 to CLOSE position and verifies breaker closes by breaker indication	
NOTES:	**CRITICAL TO RESTORE POWER TO BUS.**	
COMMENTS:		____ SAT ____ UNSAT
STEP 20:	Turn synchroscope key switch to MID-POSITION (**Step 8.1.2.16**)	
STANDARD:	Key switch for synchroscope rotated to MID position	
NOTES:		
COMMENTS:		____ SAT ____ UNSAT

STEP 21:	Insert key into 4KV TIES synchroscope switch AND turn switch to BUS 3 & 4 position (**Step 8.1.2.17**)	
STANDARD:	Inserts key and rotates switch to BUS 3 & 4 position	
NOTES:		
COMMENTS:		____ SAT ____ UNSAT
STEP 22:	Verify 4KV BUS 3-4 TIE BKR 52/19 CLOSED (**Step 8.1.2.18**)	
STANDARD:	Verifies breaker closed by breaker indication	
NOTES:		
COMMENTS:		____ SAT ____ UNSAT

STEP 23:	Turn synchroscope key switch to MID-POSITION (**Step 8.1.2.19**)	
STANDARD:	Key switch for synchroscope rotated to MID position	
NOTES:		
		____ SAT
COMMENTS:		____ UNSAT
STEP 24:	Locally verify STATION SERVICE TRANSFORMER 2A & 2F BKR 52/13 CLOSED (**Step 8.1.2.20**)	
STANDARD:	Directs local operator to verify breaker closed	
NOTES:	***CUE: AUXILIARY OPERATOR REPORTS BREAKER 52/13 IS CLOSED.***	____ SAT
COMMENTS:		____ UNSAT

STEP 25:	Verify STA SERV TRANSF 2A TO 480V SYSTEM BKR 52/1B and 480V BUS 1 MAIN BKR 52/2B CLOSED (**Step 8.1.2.21**)	***CRITICAL STEP**
STANDARD:	Verifies breaker 52/1B is closed by breaker indication AND places switch for breaker 52/2B to CLOSE position and verifies breaker closes by breaker indication	
NOTES:	**CRITICAL TO RESTORE POWER TO BUS.** **** NOTE: Only critical to close 52/2B breaker since 52/1B breaker is already closed.***	____ SAT
COMMENTS:		____ UNSAT
STEP 26:	NOTE: Use either local voltage indication at the 480V Busses or observe the RTGB indication and alarms for electrical components powered from the respective bus for verification that the bus is energized (**Note before Step 8.1.2.22**)	
STANDARD:	Acknowledges note	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 27:	Verify 480V Bus 1 is ENERGIZED (**Step 8.1.2.22**)	
STANDARD:	Verifies operation of any component powered from the bus **OR** checks for proper indication (red/green light) for components powered from MCC-1 **OR** directs local operator to verify voltage	
NOTES:	***CONDITIONAL CUE (IF LOCAL OPERATOR CONTACTED): AUXILIARY OPERATOR REPORTS VOLTAGE ON BUS 1 IS 482 VOLTS.***	____ SAT
COMMENTS:		____ UNSAT
STEP 28:	Locally verify STATION SERVICE TRANSFORMER 2C & 2G BKR 52/15 CLOSED (**Step 8.1.2.23**)	
STANDARD:	Directs local operator to verify breaker closed	
NOTES:	***CUE: AUXILIARY OPERATOR REPORTS BREAKER 52/15 IS CLOSED.***	____ SAT
COMMENTS:		____ UNSAT

STEP 29:	Verify STA SERV TRANSF 2C TO 480V SYSTEM BKR 52/16B AND 480V BUS 3 MAIN BKR 52/15B CLOSED (**Step 8.1.2.24**)	***CRITICAL STEP**
STANDARD:	Verifies breaker 52/16B is closed by breaker indication AND places switch for breaker 52/15B to CLOSE position and verifies breaker closes by breaker indication	
NOTES:	**CRITICAL TO RESTORE POWER TO BUS.** **** NOTE: Only critical to close 52/15B breaker since 52/16B breaker is already closed.***	____ SAT
COMMENTS:		____ UNSAT
STEP 30:	Verify 480V Bus 3 ENERGIZED (**Step 8.1.2.25**)	
STANDARD:	Verifies operation of any component powered from the bus **OR** checks for proper indication (red/green light) for components powered from MCC-4 **OR** directs local operator to verify voltage	
NOTES:	***CONDITIONAL CUE (IF LOCAL OPERATOR CONTACTED): AUXILIARY OPERATOR REPORTS VOLTAGE ON BUS 4 IS 481 VOLTS.***	____ SAT
COMMENTS:		____ UNSAT
	END OF TASK	

STOP TIME: ________

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

A fault occurred on the line to the Startup Transformer, causing a Loss Of Off-Site Power. Subsequently, the reactor tripped.

'A' and 'B' EDGs started and have operated as required.

PATH-1 and EPP-4, "Reactor Trip Response," actions are complete, with the plant in a stable condition.

The line to the Startup Transformer has been repaired and the initial conditions of OP-603, "Electrical Distribution," Section 8.1.1 (steps 8.1.1.1 thru 8.1.10) have been completed.

INITIATING CUES:

You are to perform OP-603, Section 8.1, starting with step 8.1.2.1 for the restoration of normal power following the loss of the startup transformer up to, but not including, the removal of the EDGs from service.

CP&L

M
Multiple Use

CAROLINA POWER & LIGHT COMPANY
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 3
PART 2

OPERATING PROCEDURE

OP-603

ELECTRICAL DISTRIBUTION

REVISION 57

SUMMARY OF CHANGES
DCF 2000P1693

STEP / SECTION	REVISION COMMENTS
2.69	Added reference to ESR 00-00161, HVS-5, HVS-6, HVE-17, and HVE-18 Manual Start Switches
4.10	Revised statement removing reference to the wide brim hard hat in the Control Room, as it is no longer stored in there. OPCF comment.
Attachment 9.1, pages 15, 16, 19, and 20 of 37	Added checks of the Local Override Switches for HVE-18, HVS-6, HVS-5, and HVE-17. Check HVS-5 and HVS-6 in the OFF position, and HVE-17 and HVE-18 in the STOP position. ESR 00-00161.

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SECTION PAGE

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1.0 PURPOSE

1.1 To provide the instructions for the startup, shutdown and infrequent operations of the Electrical Distribution System.

1.2 Transferring auxiliary electrical load from the Unit Auxiliary Transformer (UAT) to the Startup Transformer (SUT) IAW Section 7.1 satisfies a portion of the overlap testing to prove operability of the Automatic Bus Transfer required by ITS SR 3.8.1.16.

2.0 REFERENCES

2.1 UFSAR - Section 8.0, Electric Power

2.2 Improved Technical Specifications, Section 3.8, Electrical Power Systems

2.3 SD-016, 480/120 VAC Electrical System

2.4 SD-034, Main Generator and Auxiliaries System

2.5 SD-039, 230/4KV Electrical System

2.6 PRO-NGGC-0200, Procedure Use and Adherence

2.7 PLP-037, Conduct of Infrequently Performed Tests or Evolutions

2.8 PLP-049, Fuse Control Program

2.9 OMM-001-9, Equipment Tagging

2.10 OMM-035, Ground Isolation

2.11 GP-002, Cold Solid to Hot Subcritical At No Load T-Avg

2.12 GP-005, Power Operation

2.13 GP-006, Normal Plant Shutdown from Power Operations to Hot Shutdown Conditions

2.14 GP-010, Refueling

2.15 OP-202, Safety Injection and Containment Vessel Spray System

2.16 OP-601, D.C. Supply System

2.17 OP-602, Dedicated Shutdown System

2.18 OP-604, Diesel Generators "A" and "B"

2.19 OP-910, Spent Fuel Pit Cooling and Purification System

2.20 OP-926, TSC/EOF/PAP Diesel Generator

2.21 APP-009, Main Generator & Electrical

2.22 APP-021, DS/FP Annunciator A

2.23 AOP-031, Operation with High Switchyard Voltage

2.24 EPP-1, Loss of All AC Power

2.25 EPP-21, Energizing Pressurizer Heaters from Emergency Busses

2.26 EPP-22, Energizing Plant Equipment Using Dedicated Shutdown Diesel Generator

2.27 EPP-25, Energizing Supplemental Plant Equipment Using the DSDG

2.28 MST-008, Underfrequency Test On 4KV Busses

2.29 MST-009, Degraded Voltage Test On E1 and E2 Busses

2.30 MST-201, 4KV Undervoltage Test-Auto Start of Steam Driven Auxiliary Feedwater System

2.31 MST-202, 4KV Main Feedwater Breakers Open-Auto Start Test of Motor Driven Auxiliary Feedwater System

2.32 PIC-804, ABB Type 27N Electronic Undervoltage Relay

2.33 PIC-805, Westinghouse Type CV-7 Undervoltage Relays

2.34 PIC-806, Westinghouse Type KF Underfrequency Relay

2.35 PM Route, Meggering Generator Isolated Phase Bus Duct

2.36 RAIL 92R0339, Backfeeding Under Loss of Offsite Power

2.37 ACR 92-340, Control of Startup Transformer Clearance

2.38 NAD R-SP-94-08, Verification of Effective Implementation of Key RNP SOER Recommendations

2.39 SOER 90-1, Ground Faults on AC Electrical Distribution Systems

2.40 SER 91-010, Loss of Offsite Power Due to Switchyard Testing

2.41 NRC Information Notice No. 91-22: Four Plant Outage Events involving Loss of AC Power or Coolant Spills

2.42 NRC Information Notice 91-81: Switchyard Problems that Contributed to Loss of Offsite Power

2.43 O&MR 365, Isophase Bus Fault While Backfeeding to Unit Station Service Transformers During Outage

2.44 CWD B-190628 Sheet 912

2.45 CWD B-190628 Sheet 913

2.46 CWD B-190628 Sheet 923

2.47 CWD B-190628 Sheet 924

2.48 CWD B-190628 Sheet 926

2.49 CWD B-190628 Sheet 927

2.50 CWD B-190628 Sheet 930

2.51 CWD B-190628 Sheet 931

2.52 CPL DWG 5379-2382, Isolated Phase Bus Surge Protection And PT Cubicle Conn.

2.53 Dispatcher's Technical Reference Manual (DTRM) GP-22, Robinson Plant Voltage Support and Coordination

2.54 Dispatcher's Technical Reference Manual (DTRM) GP-17, Voltage Schedules for Generating Plants

2.55 Memo RNP/94-1336, File 5170, From J. D. Morris to C. D. Winters; 115 and 4 KV High Voltage, OP-603 Precautions and Limitations

2.56 RNP-C/EQ-1137, E1/E2 Switchgear Modifications & Seismic Qualification of DB-50 Circuit Breaker

2.57 CR 95-00783, Shutdown Risk Assessment of Robinson Nuclear Plant RFO-16.

2.58 Westinghouse Operation And Maintenance Memo 097, Revision 1, Recommendations for Monitoring Stator Winding Temperature of Turbine Generators

2.59 ESR 94-00882, Control Room Upgrade

2.60 CR 96-00142, PAP/EOF Diesel Generator Space Heater Breaker Found Open

2.61 Instructional Aid 96-OP-013, Electrical Distribution System

2.62 SD-039, 230/4KV Electrical System

2.63 ESR 95-00767, Resolve GIP Walkdown Issues for RFO 18

2.64 ESR 97-00302, ITS SR 3.8.1.16 Verify Automatic Transfer Capability

2.65 ESR 94-00694, Breaker Operation

2.66 ESR 96-00346, Provide Input for Turbine Generator Stator Winding Temperature

2.67 ESR 97-00450, Dedicated Shutdown Bus Backfeed

2.68 ESR 99-00250, MSIV Bypass Valve Circuit Breakers

2.69 ESR 00-00161, HVS-5, HVS-6, HVE-17, and HVE-18 Manual Start Switches

3.0 PREREQUISITES

3.1 None Applicable

4.0 PRECAUTIONS AND LIMITATIONS

4.1 Changing the position of any breaker may cause automatic initiation of plant system components. No breaker position should be changed without the Superintendent Shift Operations approval.

4.2 Do not operate the Startup and Auxiliary transformers in parallel except momentarily during transfer of power.

4.3 When operating breaker control switches from the RTGB, do not allow the control switch to SNAP back to mid-position as this may cause a momentary return to the opposite switch position.

4.4 4KV bus voltage control has the following precautions:

4.4.1 Maintain loaded 4KV bus voltage between 4000 volts and 4400 volts. If Unit 1 and Unit 2 are off-line at the same time, it may not be possible to maintain 4KV voltage above 4000 volts. 4000 volts is the design voltage for the 4KV motors with a maximum of 4400 to prevent degradation of motor insulation.

4.4.2 The Startup Transformer is lightly loaded while the plant electrical system is in the normal Power Operation alignment. This can result in an output voltage greater than 4400 volts. The transformer tap settings are set for a ratio of 115/4.368 KV with an intended 115 KV Switchyard voltage between 115 KV and 119 KV. The lightly loaded Startup Transformer winding losses are minimal thus the load side voltage is close to the transformer ratio. At 119 KV on the switchyard side of the lightly loaded transformer the load side voltage will be approximately 4.5199 KV. The high voltage condition is addressed by AOP-031. (Memo RNP/94-1336)

4.5 When a circuit or piece of equipment is de-energized by a protective device, a quick investigation should be done to evaluate equipment operating conditions and ensure there is no personnel hazard. If no cause is immediately apparent, the circuit may be restored. If the circuit should trip again, the circuit should not be reset until a thorough investigation is done to disclose the root cause. When fuse replacement is needed, the fuses shall only be replaced per controlled plant documents or equipment labeling.

4.6 Synchroscopes should be left OFF unless in use for synchronizing or taking readings.

4.7 Auto Transformer fan and pump starting temperatures and alarm setpoints:

No. 1 230/115KV Auto Transformer	No. 2 230/115KV Auto Transformer
1st set of fans on: 68°C	1st set of fans on: 79°C
2nd set of fans on: 76°C	2nd set of fans on: 80°C
High oil temp. alarm: 91°C	High oil temp. alarm: 90°C
High winding temp. alarm: 117°C	High winding temp. alarm: 115°C

4.8 The electrical TRIP/RESET buttons on the supply breakers to MCC-6, MCC-18 and MCC-5/MCC-16 on E1 and E2 buses are operable with the breaker in the fully RACKED IN or CONNECTED position.

4.9 To prevent moisture accumulation in the generator duct work, one bus cooling fan should be run on manual at all times when the generator is shutdown.

4.10 Use wide brimmed hard hats when switching the unit breakers (52-8 and 52-9) and any disconnect switches.

4.11 When opening disconnect switches, open the blades slowly for the first inch or so, when possible, to make sure there is no power load on it. If there is no load, there will be only a small static discharge, and then the switch may be fully opened. If there is a heavy power arc, the switch should be reclosed to minimize the hazard to the person doing the switching and damage to the equipment. (CP&L Safety Manual)

4.12 When closing disconnect switches, continue operating in the closed direction until the blades seat and rotate 90 degrees in the blade holder to insure proper contact with the bus.

4.13 Do not operate station service transformers in parallel.

4.14 The main bank, unit auxiliary, startup, and No. 1 and No. 2 - 230/115KV auto transformers should not be operated under load without power available to cooling fans and oil pumps for longer than 30 minutes.

4.15 Lighting Panels LP-29 and LP-33 are equipped with automatic bus transfer. LP-29 will transfer from MCC-6 to MCC-5. LP-33 will transfer from LP-29 to 125V DC MCC "A" Distribution Panel "A".

4.16 Lighting Panels LP-22, LP-34 and LP-35 are equipped with Photo-Cell actuation.

4.17 All spare breakers shall be maintained in the OPEN position.

4.18 If Generator Lockout Relays 86P and 86BU are not checked RESET prior to closing Line Disconnects to the Startup Transformer, 4KV breaker operations may occur because of electrical interlocks between breakers. (ACR 92-340)

4.19 When a breaker is operated to energize a dead-bus, the breaker switch should be held in the closed position for 4 to 8 seconds to allow time for the UV coil to be energized.

4.20 A Case determination has been performed for each section of this procedure IAW PLP-037. The case determination is defined at the beginning of each section.

4.21 The following limits exist on Unit 2 Main Generator MVAR loading:

4.21.1 Minimum MVAR load is 35 MVAR.

4.21.2 During load periods where it is necessary to carry greater than the minimum MVAR load to maintain the plant voltage schedule, the MVAR requirements will be supplied 69% from Unit 2 and 31% from Unit 1.

4.21.3 When Unit 1 is off-line the Unit 2 MVAR loading should not exceed 130 MVAR.

4.21.4 A maximum Unit 2 MVAR limit from the Capability Curve in the Plant Curve Book is applicable while Unit 1 is on-line.

4.22 The principles of ALARA shall be used in planning and performing work and operations in the Radiation Control Area.

4.23 The Isolated Phase Bus becomes an ungrounded system without any ground detection capability whenever the Generator Output Connecting Straps are disconnected. This is due to the Generator Neutral being connected to the Generator side of the Connecting Straps. (SOER 90-01, O&MR 365, NAD R-SP-94-08)

4.24 The Emergency Diesel Generator Output Breakers 52/17B and 52/27B do not normally have interlocks in effect to prevent inadvertent closing from the RTGB. The interlocks that prevent inadvertent closing from the RTGB require that both the E1 and E2 supply breakers, BKR 52/22B and BKR 52/29B, to SI Pump "B" are closed which is not the normal alignment IAW OP-202.

4.25 Reactor Trip and Bypass breakers, and 480V Emergency Buses E-1/E-2 DB-50, DB-75, and DB-100 breakers have been evaluated to meet the necessary seismic qualifications with the breaker in the racked in, test, and disconnect positions. However, if the breaker is being removed from the cubicle, once the breaker leaves the disconnect position, it must be in continuous attendance until the breaker is lowered to the floor where AP-010 will apply for seismic considerations. (ESR 95-00767 / RNP-C/EQ-1137)

8.1.1 (Continued) INIT

9. Locally verify CLOSED the following 4.16KV disconnect switches:

   a. 4.16KV Knife Switch 2A SST 2A Disconnect ____
   b. 4.16KV Knife Switch 2C SST 2C Disconnect ____
   c. 4.16KV Knife Switch for SST 2F ____
   d. 4.16KV Knife Switch for SST 2G ____

10. The Startup Transformer is ready to be returned to service. ____

8.1.2 Instructions for Restoration of Normal Power

CAUTION

All breakers shall be set up in normal operating position except breakers that tripped on low voltage, or are racked out per 8.1.1.7.

1. Verify the following relays are RESET, on the Generator Protection Relay Panel in the Control Room (ACR 92-340):

   a. Generator Lockout Relay 86P ____
   b. Generator Back-up Lockout Relay 86BU ____

8.1.2 (Continued)

INIT

CAUTION

The length of time the Startup Transformer is energized without cooling fans running shall be minimized to prevent overheating and possible damage to the transformer. Without cooling fans the transformer can be maintained at rated voltage for 6 hours at no load without causing any damage.

2. Close the LINE DISCONNECT SWITCH (Motor Operated Disconnect) AND verify the START UP TRANSF ENERGIZED white light ILLUMINATED.

DISCONNECTS CLOSED ____

WHITE LIGHT ILLUMINATED ____

NOTE: When energizing a dead bus, the synchroscope will not come to the 12 o'clock position until after the breaker is closed and the dead bus is energized.

3. Insert key into STARTUP TRANSF synchroscope switch AND turn switch to STARTUP BUS 2 position. ____

4. Close START-UP TO 4KV BUS 2 BKR 52/12. ____

5. Turn synchroscope key switch to the MID-POSITION. ____

6. Insert key into 4KV TIES synchroscope switch AND turn switch to BUS 1 & 2 position. ____

7. Verify CLOSED 4KV BUS 1-2 TIE BKR 52/10. ____

8. Turn synchroscope key switch to MID-POSITION. ____

8.1.2 (Continued) INIT

9. Locally verify STATION SERVICE TRANSFORMER 2B BKR 52/4 CLOSED. ____

10. Close 480V BUS 2B MAIN BKR 52/9B. ____

11. Verify Startup Transformer cooling fans and oil pumps OPERATING. ____

12. Verify APP-009-C7, SU TRANSF TROUBLE, EXTINGUISHED. ____

13. Close 480V BUS 2A MAIN BKR 52/8B. ____

14. Insert key into STARTUP TRANSF synchroscope switch AND turn switch to STARTUP BUS 3 position. ____

15. Close START-UP TRANSFORMER TO 4KV BUS 3 BKR 52/17. ____

16. Turn synchroscope key switch to MID-POSITION. ____

17. Insert key into 4KV TIES synchroscope switch AND turn switch to BUS 3 & 4 position. ____

18. Verify 4KV BUS 3-4 TIE BKR 52/19 CLOSED. ____

19. Turn synchroscope key switch to MID-POSITION. ____

20. Locally verify STATION SERVICE TRANSFORMER 2A & 2F BKR 52/13 CLOSED. ____

21. Verify STA SERV TRANSF 2A TO 480V SYSTEM BKR 52/1B and 480V BUS 1 MAIN BKR 52/2B CLOSED.

    52/1B CLOSED ____

    52/2B CLOSED ____

8.1.2 (Continued) INIT

> **NOTE:** Use either local voltage indication at the 480V Busses or observe the RTGB indication and alarms for electrical components powered from the respective bus for verification that the bus is energized. EXAMPLE: Restored indication for CV Purge Fans HVE-1A and HVE-1B coupled with APP-010-B6, HVE-1A/B AIR FLOW LOST/OL, demonstrates that MCC-1 and MCC-2 are energized thus 480V Busses 1 and 2B are energized.

22. Verify 480V Bus 1 is ENERGIZED. ____

23. Locally verify STATION SERVICE TRANSFORMER 2C & 2G BKR 52/15 CLOSED. ____

24. Verify STA SERV TRANSF 2C TO 480V SYSTEM BKR 52/16B AND 480V BUS 3 MAIN BKR 52/15B CLOSED.
    52/16B CLOSED ____
    52/15B CLOSED ____

25. Verify 480V Bus 3 ENERGIZED. ____

26. Remove Diesel Generator "A" from service IAW OP-604. ____

27. Remove Diesel Generator "B" from service IAW OP-604. ____

28. Locally verify STATION SERVICE TRANSFORMER 2D BKR 52/28 CLOSED. ____

29. Locally close 480V BUS 4 MAIN BKR 52/30B. ____

8.1.2 (Continued) INIT

> **NOTE:** The TSC/EOF/PAP Diesel Generator has two Automatic Transfer Switches (ATS). ATS-1 serves the TSC/EOF with ATS-2 for PAP West. Normal power must be restored to both ATS-1 and ATS-2 before the Diesel Generator will fully unload and shutdown.

30. Perform the following while continuing on with the remainder of this procedure:
    a. AFTER a time delay of at least 5 minutes, THEN check that ATS-2 automatically transfers the PAP West loads to 480V Bus 4. ____
    b. IF the TSC/EOF/PAP Diesel Generator is fully unloaded, THEN check that the Diesel Generator automatically shuts down after at least 5 minutes of unloaded operation. ____
    c. IF the TSC/EOF/PAP Diesel Generator is carrying the TSC/EOF loads OR, IF ATS-2 did not transfer PAP West loads, THEN perform the following while continuing with the remainder of this procedure:
       - Determine which load(s) are still on the Diesel Generator. TSC/EOF or PAP WEST ____ (Circle applicable loads)
       - Periodically verify proper Diesel Generator operation IAW OP-926. ____
       - IF either ATS-1 or ATS-2 did not properly transfer loads, THEN inform the Superintendent Shift Operations of the problem(s) encountered. ____
       - AFTER all normal power is restored AND all ATS problems are corrected, THEN check for proper load transfer AND Diesel Generator shutdown. ____

8.1.2 (Continued) INIT

CAUTION
The DS Bus may be energized by the DSDG IAW EPP-21 or EPP-25. Perform Step 8.1.2.31 if the bus is not energized by the DSDG. Perform Step 8.1.2.32 if the DS Bus is energized by the DSDG.

31. IF the DS Bus is not energized from the DSDG, THEN perform the following steps:

    a. Verify the following 480V D.S. Bus load breakers are RACKED OUT:

    - Service Water Pump "D" Emergency BKR 52/33B. ____
    - Component Cooling Water Pump "A" BKR 52/33C. ____
    - RHR Pump "A" or "B" Emergency BKR 52/33D. ____
    - Charging Pump "A" BKR 52/34B. ____
    - Alternate Power Supply to MCC-5 BKR 52/34C. ____
    - Power Panel 51 BKR 52/34D. ____

    b. At the DSDG Remote Control Panel in the 4160 Switchgear Room, close 480V BUS D.S. MAIN BKR 52/32A. ____

    c. Verify APP-036-H8, DS BUS UNDER VOLT, EXTINGUISHED. ____

8.1.2.31 (Continued) INIT

d. Rack in the following 480V DS Bus breakers:

- Service Water Pump "D" Emergency BKR 52/33B. ____
- Component Cooling Water Pump "A" BKR 52/33C. ____
- RHR Pump "A" or "B" Emergency BKR 52/33D. ____
- Charging Pump "A" BKR 52/34B. ____
- Alternate Power Supply to MCC-5 BKR 52/34C. ____
- Power Panel 51 BKR 52/34D. ____

e. Locally Close the following 480V DS Bus breakers:

- Alternate Power Supply to MCC-5 BKR 52/34C. ____
- Power Panel 51 BKR 52/34D. ____

32. IF the DS Bus is energized from the DSDG, THEN transfer the DS Bus to normal power AND shutdown the DSDG IAW OP-602.

DS BUS ON NORMAL POWER ____

DSDG SHUTDOWN ____

33. Locally verify in the 4160V room FEED TO 4KV BUS 5 BKR 52/24 CLOSED. ____

34. Locally verify STATION SERVICE TRANSFORMER 2E BKR 52/32 CLOSED. (Turbine Building Ground Floor East of Seal Oil System.) ____

35. Locally Close STATION SERVICE TRANSFORMER 2E TO 480V BUS 5 BKR 52/37B by taking CONTROL SW. MAIN to the CLOSE position. ____

8.1.2 (Continued) INIT

36. Refer to Section 5.1 of this procedure for aligning the Electrical Distribution System for Unit 2 Startup. ____

	Initials	Name (Print)	Date
Performed by:	______	______	______
	______	______	______
	______	______	______
	______	______	______
	______	______	______

Approved By: ______________________ ________
Superintendent Shift Operations Date

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM SRO-B.1.d

Perform Emergency Boration (EPP-4)

CANDIDATE: ______________________________

EXAMINER: ______________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task: Perform Emergency Boration (EPP-4)

Alternate Path: Several failures cause Emergency Boration flowpath to be only available path.

Facility JPM #: CR-076

K/A Rating: 004A4.18 Importance: SRO 3.8 RO NA

K/A Statement: Ability to manually operate and/or monitor in the control room: Emergency borate valve

Task Standard: Emergency boration flow has been established from the boric acid tank to the RCS.

Preferred Evaluation Location: Simulator X In Plant ______

Preferred Evaluation Method: Perform X Simulate ______

References: EPP-004, Reactor Trip Response

Validation Time: 10 minutes Time Critical: NO

Candidate: ______________________________

Time Start: ________ Time Finish: ________

Performance Time: ________ minutes

Performance Rating: SAT ________ UNSAT ________

Comments: ______________________________

____

Examiner: ______________________________ Date: ________
Signature

Tools/Equipment/Procedures Needed:

EPP-004

SIMULATOR OPERATOR INSTRUCTIONS: Refer to next page, "SIMULATOR SETUP INSTRUCTIONS".

READ TO OPERATOR

DIRECTION TO CANDIDATE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

During a plant startup, the reactor tripped on an Intermediate Range channel failure.

PATH-1 and EPP-4, "Reactor Trip Response," actions are being taken.

FOLDOUT-A is in effect.

Two (2) rods have NOT fully inserted on the trip.

INITIATING CUES:

You are to perform the actions of EPP-4, "Reactor Trip Response," Step 12.

SIMULATOR SETUP INSTRUCTIONS

1) Reset simulator to IC-211 (3% power).
2) Insert MFI CRF04A, L11, shutdown bank rod L11 untrippable.
3) Insert MFI CRF04B, E7, Control bank A rod E7 untrippable.
4) Insert MFI NIS05A, -3, intermediate range instrument failed high.
5) Insert MFI CVC21 0 to cause LCV-115B to fail closed.
6) Insert OVD XAAI166 to cause FCV-113A to fail closed.
7) Insert override to cause CVC-310B to be failed closed.
8) RUN simulator until the reactor trips and related annunciators are in ALARM.
9) Reset SPDS.
10) FREEZE the simulator.

START TIME: ________

STEP 1: Locates proper procedure and required information. STANDARD: Locates EPP-004, Step 12 NOTES: ***NOTE: The only flowpath that will function is the Emergency Boration path. Candidate is NOT required to attempt any other flowpaths, but is likely to based on listed order in procedure. HOWEVER, if candidate bypasses any of the other listed flowpaths without attempting to perform them, this is acceptable. JPM steps which address the bypassed flowpaths should then be marked "N/A."*** COMMENTS:	____ SAT ____ UNSAT
STEP 2: Check ALL Control Rods - FULLY INSERTED STANDARD: Determines rods E7 and L11 did NOT fully insert by rod position indication on RTGB or ERFIS NOTES: ***NOTE: Also gave as part of initial conditions.*** COMMENTS:	____ SAT ____ UNSAT

STEP 3:	IF only one Control Rod is stuck out, THEN Go To Step 13	
STANDARD:	Determines more than one rod stuck out and continues with RNO	
NOTES:		
COMMENTS:		___ SAT ___ UNSAT
STEP 4:	IF two or more Control Rods are stuck out, THEN perform the following: Verify at least one Charging Pump is RUNNING	
STANDARD:	Verifies two Charging Pump running by breaker indication	
NOTES:		
COMMENTS:		___ SAT ___ UNSAT

STEP 5:	Borate to cold shutdown boron concentration using one of the following: - Blender to Charging Pump suction: Open FCV-113A, BA TO BLENDER	
STANDARD:	Attempts to open FCV-113A by placing switch in OPEN position, but determines valve fails to open by position indication	
NOTES:	***NOTE: If this flowpath is NOT attempted, mark this JPM Step as "N/A."***	____ SAT
COMMENTS:		____ UNSAT
STEP 6:	RWST to Charging Pump suction: Open LCV-115B, EMERG MU TO CHG SUCT, OR locally open CVC-358, RWST TO CHARGING PUMP SUCTION	
STANDARD:	Attempts to open LCV-115B by placing switch in OPEN position, but determines valve fails to open by position indication **- OR -** Directs AO to locally open CVC-358	
NOTES:	***CONDITIONAL CUE (IF AO DIRECTED TO OPEN CVC-358): AUXILIARY OPERATOR REPORTS CVC-358 WILL NOT COME OFF THE CLOSED SEAT.*** ***NOTE: If this flowpath is NOT attempted, mark this JPM Step as "N/A."***	____ SAT
COMMENTS:		____ UNSAT

STEP 7:	Blender to VCT: Open FCV-113A, BA TO BLENDER	
STANDARD:	Determines unable to open FCV-113A on previous attempt	
NOTES:	***NOTE: If this flowpath is NOT attempted, mark this JPM Step as "N/A."***	____ SAT
COMMENTS:		____ UNSAT
STEP 8:	Emergency boration: Open MOV-350, BA TO CHARGING PMP SUCT	**CRITICAL STEP**
STANDARD:	Places switch for MOV-350 to OPEN position and verifies valve opens by position indication	
NOTES:	**CRITICAL TO ESTABLISH SOURCE OF BORIC ACID TO CHARGING PUMP.**	____ SAT
COMMENTS:		____ UNSAT

STEP 9:	Start Boric Acid Pump aligned for blend	**CRITICAL STEP**
STANDARD:	Places switch for Boric Acid Pump to START and verifies pump starts by breaker indication and flow indication	
NOTES:	**CRITICAL TO PROVIDE ADEQUATE PRESSURE TO CAUSE BORIC ACID FLOW TO CHARGING PUMP.**	____ SAT
COMMENTS:		____ UNSAT
STEP 10:	Verify boric acid flow on FI-110	
STANDARD:	Verifies flow indication on FI-110	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 11:	Open CVC-310B, LOOP 2 COLD LEG CHG	
STANDARD:	Attempts to open CVC-310B by placing switch to OPEN and determines valve fails to open by position indication and flow indication	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
STEP 12:	Open CVC-310A, LOOP 1 COLD LEG CHG	**CRITICAL STEP**
STANDARD:	Places switch for CVC-310A to OPEN and verifies valve opens by position indication and flow indication	
NOTES:	**CRITICAL TO PROVIDE FLOWPATH FROM CHARGING PUMP TO RCS.**	____ SAT
COMMENTS:		____ UNSAT

STOP TIME: ________

STEP 13:	Verify charging flow on FI-122A	
STANDARD:	Verifies flow indication on FI-122A	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
	END OF TASK	

STOP TIME: ________

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

During a plant startup, the reactor tripped on an Intermediate Range channel failure.

PATH-1 and EPP-4, "Reactor Trip Response," actions are being taken.

FOLDOUT-A is in effect.

Two (2) rods have NOT fully inserted on the trip.

INITIATING CUES:

You are to perform the actions of EPP-4, "Reactor Trip Response," Step 12.

CONTINUOUS USE

CAROLINA POWER & LIGHT COMPANY

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 3

PART 4

END PATH PROCEDURE

EPP-4

REACTOR TRIP RESPONSE

REVISION 17

Effective Date ___________

RECOMMENDED BY: ____ ___________
Procedure Sponsor Date

APPROVED BY: ____ ___________
Manager - Operations Date

LIST OF EFFECTIVE PAGES

EFFECTIVE PAGES	REVISION
Cover Sheet	17
LEP	17
3 through 23	17

Summary of Changes

All: Changed S/G level setpoints for heatsink.

Purpose and Entry Conditions

(Page 1 of 1)

1. PURPOSE

   This procedure provides the necessary instructions to stabilize and control the plant following a Reactor trip without a Safety Injection.

2. ENTRY CONDITIONS

   Path-1 when a Reactor trip has occurred and SI is not initiated or required.

- END -

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED
* 1.	Check SI Signal - INITIATED	<u>IF</u> SI initiation occurs during this procedure, <u>THEN</u> Go To Path-1, Entry Point A. Go To Step 3.
2.	Go To Path-1, Entry Point A	
3.	Perform The Following: a. Reset SPDS b. Initiate monitoring of Critical Safety Function Status Trees	
4.	Open Foldout A	
5.	Check RCS Temperature - STABLE AT <u>OR</u> TRENDING TO 547°F	Go To Step 7.
6.	Observe <u>CAUTION</u> Prior To Step 8 And Go To Step 8	

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED
7.	Control RCS Temperature As Follows:	
	a. Check RCS temperature - LESS THAN 547°F AND DECREASING	a. Go To Step 7.f.
	b. Stop dumping steam	
	c. Check S/G levels - ANY GREATER THAN 8%	c. Perform the following: • Establish FW bypass flow greater than $0.2x10^6$ pph until level in at least one S/G is greater than 8%. OR • Establish AFW flow greater than 300 gpm until level in at least one S/G is greater than 8%. Go To Step 7.e.
	d. Reduce total feed flow, as necessary, to stop cooldown	
	e. Check RCS cooldown - STOPPED	e. Close MSIVs AND MSIV BYPs. IF RCS Temperature decreases below 530°F, THEN borate the RCS to CSD boron concentration.
	f. Check RCS temperature - GREATER THAN 547°F AND INCREASING	f. Observe CAUTION prior to Step 8 and Go To Step 8.
	g. Check steam dump to Condenser - AVAILABLE	g. Dump steam using STEAM LINE PORVs to obtain 547°F.
	h. Dump steam to Condenser to obtain 547°F	

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED

****

CAUTION

If only one SW Pump is running, it is subject to runout until the following step is completed.

****

8.	Check SW System Operation:	
	a. Check SW Header pressure - LESS THAN 40 PSIG	a. Go To Step 8.d.
	b. Start additional SW Pumps as necessary to obtain 40 psig to 50 psig SW Header pressure	
	c. Check SW Header pressure - GREATER THAN 40 PSIG	c. Isolate SW to the Turbine Building as follows: • Close V6-16C, SW TURB BLDG ISO. OR • Close V6-16A AND V6-16B, SW TURB BLDG SUPPLY. Go To Step 9.
	d. Check SW Header pressure - GREATER THAN 50 PSIG	d. Go To Step 11.
	e. Stop SW Pumps, as required, to maintain SW Header pressure between 40 psig and 50 psig	
	f. Go To Step 11	

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED
9.	Shutdown Secondary Systems As Follows:	
	a. Close all MSIVs <u>AND</u> MSIV Bypass Valves	
	b. Break vacuum to the Condenser as follows: 1) Depress <u>AND</u> hold the THINK Pushbutton 2) Open VACUUM BREAKER VALVES: • MS-70A • MS-70B	
	c. Verify the following equipment - STOPPED: • FW PUMP A • FW PUMP B • COND PUMP A • COND PUMP B • HEATER DRAIN PUMP A • HEATER DRAIN PUMP B • GOV FLUID PUMP A • GOV FLUID PUMP B • VACUUM PUMP A • VACUUM PUMP B • Primary Air Compressor	
	d. Check SW Header Pressure - LESS THAN 40 PSIG	d. Go To Step 11.

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED
10.	Throttle CCW Heat Exchanger Outlets As Follows:	
	a. Check CCW Heat Exchanger B - IN SERVICE	a. Throttle CCW Heat Exchanger A outlet as follows: 1) Open SW-271, ROOT VALVE PI-1619A. 2) Close SW-740, CCW HEAT EXCHANGER "B" RETURN. 3) Throttle SW-739, CCW HEAT EXCHANGER "A" RETURN, to establish 40 psig to 50 psig SW Header pressure as indicated on PI-1619A. 4) Close SW-271, ROOT VALVE PI-1619A. 5) Go To Step 11.
	b. Throttle CCW Heat Exchanger B Outlet as follows: 1) Open SW-260, ROOT VALVE PI-1619B 2) Close SW-739, CCW HEAT EXCHANGER "A" RETURN 3) Throttle SW-740, CCW HEAT EXCHANGER "B" RETURN, To establish 40 psig to 50 psig SW Header pressure as indicated on PI-1619B 4) Close SW-260, ROOT VALVE PI-1619B	

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED
*11.	Determine Feedwater Status:	
	a. Check RCS average temperature - LESS THAN 554°F	a. WHEN RCS average temperature less than 554°F, THEN perform Steps 11.b and 11.c. Observe CAUTION prior to Step 12 and Go To Step 12.
	b. Verify FW REG VALVEs - CLOSED	b. Close the FW HDR SECTION Valves: • V2-6A • V2-6B • V2-6C
	c. Establish FW bypass flow to maintain level in intact S/Gs between 39% and 50%	c. Establish AFW flow to S/Gs.

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED

****

CAUTION

The boration pathway through FCV-114B does NOT have heat trace. Use of this pathway without flush water could result in blockage of the pathway.

****

12. Check All Control Rods - FULLY INSERTED

IF only one Control Rod is stuck out, THEN Go To Step 13.

IF two or more Control Rods are stuck out, THEN perform the following:

a. Verify at least one Charging Pump is RUNNING.

b. Borate to cold shutdown boron concentration using one of the following:

- Blender to Charging Pump suction:

  1) Open FCV-113A, BA TO BLENDER.

  2) Open FCV-113B, BLENDED MU TO CHG SUCT.

  3) Start Boric Acid Pump aligned for blend.

OR

- RWST to Charging Pump suction:

  1) Open LCV-115B, EMERG MU TO CHG SUCT, OR locally open CVC-358, RWST TO CHARGING PUMP SUCTION.

  2) Close LCV-115C, VCT OUTLET.

OR

(CONTINUED NEXT PAGE)

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED
12.	(CONTINUED)	
		• Blender to VCT: 1) Open FCV-113A, BA TO BLENDER. 2) Open FCV-114B, BLENDED MU TO VCT. 3) Start Boric Acid Pump aligned for blend. <u>OR</u> • Emergency boration: 1) Open MOV-350, BA TO CHARGING PMP SUCT. 2) Start Boric Acid Pump aligned for blend. 3) Verify boric acid flow on FI-110.
		c. Open CVC-310B, LOOP 2 COLD LEG CHG. <u>IF</u> CVC-310B will <u>NOT</u> open, <u>THEN</u> open CVC-310A, LOOP 1 HOT LEG CHG.
		d. Verify charging flow on FI-122A.
13.	Check PZR Level - LESS THAN 14%	Go To Step 15.

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED
*14.	Verify Letdown Isolation As Follows:	
	a. Place CVC-460A & B, LTDN LINE STOP, to the CLOSE position	
	b. Verify PZR Heaters OFF	
	c. Control charging to restore PZR level to greater than 14%	
	d. Check PZR level - GREATER THAN 14%	d. <u>WHEN</u> PZR level is greater than 14%, <u>THEN</u> perform Steps 14.e and 14.f. Go To Step 15.
	e. Place letdown in service using OP-301-1, Chemical and Volume Control System (Infrequent Operation)	
	f. Reset PZR Heaters as follows: 1) Place the control switch for PZR HTR CONTROL GROUP to the OFF position and return to the ON position. 2) Place the control switch for PZR HTR BACK-UP GROUP A to the OFF position and return to the AUTO position. 3) Place the control switch for PZR HTR BACK-UP GROUP B to the OFF position and return to the AUTO position.	

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM COM-B.1.e

Manually Initiate Containment Spray (PATH-1)

CANDIDATE: ______________________

EXAMINER: ______________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task: Manually Initiate Containment Spray (PATH-1)

Alternate Path: Automatic valves fail to open and spray add valve mispositioned, requiring manual postioning.

Facility JPM #: CR-003

K/A Rating: 011EA1.04 Importance: SRO 4.4 RO 4.4

K/A Statement: Ability to operate and monitor the following as they apply to a Large Break LOCA: ESF actuation system in manual

Task Standard: Containment spray injecting with SI-845C throttled to obtain approximately 12 gpm spray additive flow.

Preferred Evaluation Location: Simulator X In Plant ____

Preferred Evaluation Method: Perform X Simulate ____

References: PATH-1

Validation Time: 10 minutes Time Critical: NO

Candidate: ____________________

Time Start: ________ Time Finish: ______

Performance Time: ______ minutes

Performance Rating: SAT ______ UNSAT ______

Comments: ______________________________

____

Examiner: ____________________ Date: ______
Signature

Tools/Equipment/Procedures Needed:

PATH-1

SIMULATOR OPERATOR INSTRUCTIONS:

1) Reset simulator to IC-205.
2) Set remote functions CNS006 thru CNS011 to NO-AUTO (prevents 880s and 845s from opening).
3) Activate malfunction RCS01A at 100%.
4) Ensure Containment Pressure indicators are reading greater than 10 psig.
5) Stop the RCPs.
6) Close the MSR Purge Valves.
7) Verify MSIVs are closed.
8) Reposition SI-845C so approximately 30 gpm flow will occur when placed in service.
8) FREEZE the simulator.

READ TO OPERATOR

DIRECTION TO CANDIDATE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

A rapid RCS depressurization occurred, resulting in an automatic trip and safety injection.

Path-1 has been implemented and Step B-7, "CV Press Remained Below 10 psig," has been answered "NO".

INITIATING CUES:

You are to respond to the high containment pressure per PATH-1.

START TIME: ________

STEP 1: Locates proper procedure and required information STANDARD: Locates PATH-1, Step B-7 NOTES: ***NOTE: SRO procedure reader will provide reading of steps.*** COMMENTS:	____ SAT ____ UNSAT
STEP 2: Verify CV Spray Initiated STANDARD: Verifies CV Spray initiated by determining Spray Pumps running and APP-002-D1, SPRAY ACTUATION, alarming NOTES: COMMENTS:	____ SAT ____ UNSAT

STEP 3: Verify all CV Spray Pumps running with valves properly aligned STANDARD: Verifies Spray Pumps running by breaker indication and determines valves are NOT properly aligned by position indication and flow indication NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 4: Aligns Spray Pump discharge valves STANDARD: Places switches for following valves to OPEN position and verifies valves open by position indication and flow indication (FI-958A & B) - SI-880A, CV Spray Pump 'A' Discharge - SI-880B, CV Spray Pump 'A' Discharge - SI-880C, CV Spray Pump 'B' Discharge - SI-880D, CV Spray Pump 'B' Discharge NOTES: **CRITICAL TO PROVIDE SPRAY FLOW.** COMMENTS:	**CRITICAL STEP** ____ SAT ____ UNSAT

STEP 5:	Aligns Spray Additive Tank isolation valves	**CRITICAL STEP**
STANDARD:	Places switches for following valves to OPEN position and verifies valves open by position indication and flow indication (FI-949) - SI-845A, SAT Discharge - SI-845B, SAT Discharge	
NOTES:	**CRITICAL TO PROVIDE SPRAY ADDITIVE TANK FLOW.**	____ SAT
COMMENTS:		____ UNSAT
STEP 6:	Verify approximately 12 gpm Spray Additive Tank flow	**CRITICAL STEP**
STANDARD:	Determines Spray Additive Tank flow is approximately 30 gpm AND throttles SI-845C, SAT THROTTLE VALVE, in CLOSE direction to establish approximately 12 gpm per flow indication (FI-949)	
NOTES:	**CRITICAL TO PROVIDE SPRAY ADDITIVE TANK FLOW AT PROPER INJECTION RATE.**	____ SAT
COMMENTS:		____ UNSAT
	END OF TASK	

STOP TIME: ________

CANDIDATE CUE SHEET

(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

A rapid RCS depressurization occurred, resulting in an automatic trip and safety injection.

Path-1 has been implemented and Step B-7, "CV Press Remained Below 10 psig," has been answered "NO".

INITIATING CUES:

You are to respond to the high containment pressure per PATH-1.

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM COM-B.1.f

Perform NIS Comparator Channel Surveillance (OST-007)

CANDIDATE: ______________________________

EXAMINER: ______________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task: Perform NIS Comparator Channel Surveillance (OST-007)

Alternate Path: NONE

Facility JPM #: NEW

K/A Rating: 015A4.02 Importance: SRO 3.9 RO 3.9

K/A Statement: Ability to manually operate and/or monitor in the control room: NIS indicators

Task Standard: OST-007 has been completed for NIS channel N-41.

Preferred Evaluation Location: Simulator X In Plant ____

Preferred Evaluation Method: Perform X Simulate ____

References: OST-007, Nuclear Instrument Comparator Channel

Validation Time: 30 minutes Time Critical: NO

Candidate: ____________________

Time Start: ________ Time Finish: ________

Performance Time: ________ minutes

Performance Rating: SAT ________ UNSAT ________

Comments: ____________________

____

Examiner: ____________________ Date: ________
Signature

Tools/Equipment/Procedures Needed:

OST-001

SIMULATOR OPERATOR INSTRUCTIONS:
1) Reset simulator to IC-5.
2) FREEZE the simulator.
3) WHEN DIRECTED by JPM instructions, insert / remove MRF BST046 and MRF BST049 to trip and/or reset bistables for OP ΔT and OT ΔT (BS-412C-1 and BS-412B-1).

READ TO OPERATOR

DIRECTION TO CANDIDATE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

The unit is operating at 100% power.

All Power Range NIS channels are operable.

OST-007, "Nuclear Instrument Comparator Channel," is scheduled to be performed for NIS channel N-41.

All prerequisites have been completed and the SSO has given permission to perform the test.

INITIATING CUES:

You are to perform OST-007 for NIS channel N-41.

START TIME: ________

STEP 1: Locates proper procedure and required information. STANDARD: Locates OST-007, Section 7.1 NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 2: Position NIS CHANNEL SELECTOR NR 45 switch to a Power Range not being tested (**Step 7.1.1**) STANDARD: Places switch to N-42, N-43, or N-44 position NOTES: COMMENTS:	____ SAT ____ UNSAT

STEP 3:	IF the ERFIS computer is in service, THEN perform the following: Use the "DR" turn-on code to delete ERFIS point NIN0041A from scan (**Step 7.1.2.1**)	
STANDARD:	Deletes ERFIS point from scan using "DR" turn-on code	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
STEP 4:	Check RTGB annunciator APP-005-D6, ΔFLUX WARNING/STATUS, ILLUMINATES within 5 minutes (**Step 7.1.2.2**)	
STANDARD:	Verifies APP-005-D6 alarms within 5 minutes	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 5: WHEN APP-005-D6 illuminates, THEN check ERFIS printout indicates channel #1 is no longer in service (**Step 7.1.2.3**) STANDARD: Checks ERFIS printout to determine that N-41 no longer in service NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 6: NOTE: An out-of-service Source Range(SR) or Intermediate Range(IR) will cause APP-005-D4, NIS TRIP/DROP ROD BYPASS, annunciator light to be ILLUMINATED (**Note before Step 7.1.3**) STANDARD: Acknowledges note NOTES: ***NOTE: All IR channels are in service. SR channels are de-energized.*** COMMENTS:	____ SAT ____ UNSAT

STEP 7:	IF RTGB annunciator APP-005-D4, NIS TRIP/DROP ROD BYPASS, is ILLUMINATED, THEN N/A Step 7.1.6 (**Step 7.1.3**)	
STANDARD:	Determines APP-005-D4 is EXTINGUISED and does NOT "N/A" Step 7.1.6	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
STEP 8:	Place the DROPPED ROD MODE switch, on NI-41A Power Range "A" drawer, in the BYPASS position (**Step 7.1.4**)	**CRITICAL STEP**
STANDARD:	Places DROPPED ROD MODE switch in the BYPASS position on NI-41A	
NOTES:	**CRITICAL TO PREVENT A TURBINE RUNBACK FROM OCCURRING.**	____ SAT
COMMENTS:		____ UNSAT

STEP 9: Check the DROPPED ROD BYPASS indicator, on NI-41A Power Range "A" drawer, ILLUMINATED (**Step 7.1.5**) STANDARD: Determines DROPPED ROD BYPASS indicator on NI-41A illuminated NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 10: Check RTGB annunciator APP-005-D4, NIS TRIP/DROP ROD BYPASS, ILLUMINATED (**Step 7.1.6**) STANDARD: Determines APP-005-D4 illuminated NOTES: COMMENTS:	____ SAT ____ UNSAT

STEP 11:	Check NIS ROD DROP BYPASS NI-41 status light, on the RTGB, ILLUMINATED (**Step 7.1.7**)	
STANDARD:	Determines ROD DROP BYPASS NI-41 status light illuminated	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
STEP 12:	CAUTION: Access to the Overpower ΔT and Overtemperature ΔT bistable switches for the Power Range channel being tested requires entry into ONLY ONE Hagan Rack cabinet. Entry into more than one Hagan Rack cabinet while repositioning bistable switches for a Power Range channel may result in a reactor trip (**Caution before Step 7.1.8**)	
STANDARD:	Acknowledges caution	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 13:	NOTE: Entry into the Hagan Rack cabinets will cause annunciator APP-036-L1, PROT RACK DOOR OPEN, to illuminate (**Note before Step 7.1.8**)	
STANDARD:	Acknowledges note and anticipates alarm	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
STEP 14:	Place the OVERPOWER ΔT and the OVERTEMPERATURE ΔT Reactor Trip Bistable switches for N-41, located in RACK NO. 1 PROTECTION CH. SET I panel, in the TRIPPED position. - BS-412C-1 - BS-412B-1 (**Step 7.1.8**)	
STANDARD:	Informs CRSS that bistables need to be placed in tripped condition	
NOTES:	***NOTE: Not considered critical since another operator is performing actions.*** ***CUE: A SPARE OPERATOR WILL PLACE BISTABLES IN TRIPPED CONDITION.***	____ SAT
COMMENTS:		____ UNSAT
	SIMULATOR OPERATOR INSTRUCTIONS: Place bistables BS-412C-1 and BS-412B-1 in TRIPPED condition by inserting MRF BST046 and MRF BST049 to TRIP.	

STEP 15:	Check N-41 bistable status lights on Bistable Status Panel 'B' AND associated RTGB alarms, ILLUMINATED. - OTΔT Loop 1 TC412C1 - OPΔT Loop 1 TC412B1 - APP-003-B6, OVERPOWER ΔT - APP-003-C6, OVERTEMPERATURE ΔT (**Step 7.1.9**)	
STANDARD:	Verifies bistable status lights and alarms illuminated	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
STEP 16:	Place the ROD STOP BYPASS switch, on the NIS Miscellaneous Control and Indication Panel, in the BYPASS PR 41 position (**Step 7.1.10**)	**CRITICAL STEP**
STANDARD:	Places the ROD STOP BYPASS switch in BYPASS PR 41 position	
NOTES:	**CRITICAL TO ALLOW ROD MOVEMENT DURING TESTING OF NI-41.**	____ SAT
COMMENTS:		____ UNSAT

STEP 17:	Turn the DETECTOR "A" TEST SIGNAL potentiometer, on NI-41B Power Range "B" drawer, full counter-clockwise (CCW) (**Step 7.1.11**)	
STANDARD:	Verifies potentiometer for Detector "A' test rotated to full CCW position	
NOTES:	***NOTE: Should have been left in this position upon completion of last test using potentiometer.***	____ SAT
COMMENTS:		____ UNSAT
STEP 18:	Turn the DETECTOR "B" TEST SIGNAL potentiometer, on NI-41B Power Range "B" drawer, full counter-clockwise (CCW) (**Step 7.1.12**)	
STANDARD:	Verifies potentiometer for Detector "B' test rotated to full CCW position	
NOTES:	***NOTE: Should have been left in this position upon completion of last test using potentiometer.***	____ SAT
COMMENTS:		____ UNSAT

STEP 19: Place the DETECTOR "A" RANGE MILLI-AMPS switch, on NI-41B Power Range "B" drawer, in the 0.5 position (**Step 7.1.13**) STANDARD: Places switch to read Detector "A" current to the 0.5 position NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 20: Place the DETECTOR "B" RANGE MILLI-AMPS switch, on NI-41B Power Range "B" drawer, in the 0.5 position (**Step 7.1.14**) STANDARD: Places switch to read Detector "B" current to the 0.5 position NOTES: COMMENTS:	____ SAT ____ UNSAT

STEP 21:	Place the OPERATION SELECTOR switch, on NI-41B Power Range "B" drawer, in the DET "A" & "B" position (**Step 7.1.15**)	**CRITICAL STEP**
STANDARD:	Places the OPERATION SELECTOR switch in the DET A & B position	
NOTES:	**CRITICAL TO ALLOW POTENTIOMETER OPERATIONS TO FUNCTION DURING TESTING.** ***NOTE: Expected alarm to be received is APP-005-D3, NIS CHANNEL TEST.***	____ SAT
COMMENTS:		____ UNSAT
STEP 22:	Check the CHANNEL ON TEST indicator, on NI-41B Power Range "B" drawer, ILLUMINATED (**Step 7.1.16**)	
STANDARD:	Determines CHANNEL ON TEST on NI-41B is illuminated	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 23: Check RTGB annunciator APP-005-D3, NIS CHANNEL TEST, ILLUMINATED (**Step 7.1.17**) STANDARD: Determines APP-005-D3 is illuminated NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 24: NOTE: APP-005-F3, PR UPPER CH HI FLUX DEV/AUTO DEFEAT, and/or APP-005-F4, PR LOWER CH HI FLUX DEV/AUTO DEFEAT, may alarm when the potentiometers are adjusted (**Note before Step 7.1.18**) STANDARD: Acknowledges note and anticipates alarms NOTES: COMMENTS:	____ SAT ____ UNSAT

STEP 25:	Turn the DETECTOR "A" AND/OR DETECTOR "B" TEST SIGNAL potentiometer(s), on NI-41B Power Range "B" drawer, clockwise (CW) until the CHANNEL DEVIATION indicator, on Comparator and Rate drawer, ILLUMINATES (**Step 7.1.18**)	**CRITICAL STEP**
STANDARD:	Rotates potentiometer(s) slowly in CW direction until CHANNEL DEVIATION illuminates	
NOTES:	**CRITICAL TO ALLOW DETERMINING SETPOINT FOR ALARM.** ***NOTE: Expected alarms are:*** ***APP-005-F3/F4, PR UPPER/LOWER CH HI FLUX DEV/AUTO DEFEAT*** ***APP-005-C3, PR CHANNEL DEV***	____ SAT
COMMENTS:		____ UNSAT
STEP 26:	Record the deviation between N-41 and the lowest Power Range Channel not being tested (2.5% - 3.5%) (**Step 7.1.19**)	**CRITICAL STEP**
STANDARD:	Determines deviation between N-41 and lowest other Power Range channel to be between 2.5% and 3.5%	
NOTES:	**CRITICAL TO DETERMINE PROPER OPERATION OF COMPARATOR.** ***NOTE: May be outside acceptable range if potentiometer rotated too quickly in previous step.***	____ SAT
COMMENTS:		____ UNSAT

STEP 27: Check RTGB annunciator APP-005-C3, PR CHANNEL DEV, ILLUMINATED (**Step 7.1.20**) STANDARD: Determines APP-005-C3 is illuminated NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 28: Turn the DETECTOR "A" AND DETECTOR "B" TEST SIGNAL potentiometer(s), on NI-41B Power Range "B" drawer, full counter-clockwise (CCW) (**Step 7.1.21**) STANDARD: Rotates both Detector "A" and Detector "B" test potentiometers full CCW NOTES: COMMENTS:	____ SAT ____ UNSAT

STEP 29:	Check RTGB annunciator APP-005-C3, PR CHANNEL DEV, EXTINGUISHED (**Step 7.1.22**)	
STANDARD:	Determines APP-005-C3 is extinguished	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
STEP 30:	Check the CHANNEL DEVIATION indicator, on Comparator and Rate drawer, EXTINGUISHED (**Step 7.1.23**)	
STANDARD:	Determines CHANNEL DEVIATION is extinguished	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 31:	Place the OPERATION SELECTOR switch, on NI-41B Power Range "B" drawer, in the NORMAL position (**Step 7.1.24**)	**CRITICAL STEP**
STANDARD:	Places OPERATION SELECTOR switch on NI-41B in NORMAL position	
NOTES:	**CRITICAL TO RESTORE CHANNEL TO OPERABLE STATUS.**	
COMMENTS:		____ SAT ____ UNSAT
STEP 32:	Check the CHANNEL ON TEST indicator, on NI-41B Power Range "B" drawer, EXTINGUISHED (**Step 7.1.25**)	
STANDARD:	Determines CHANNEL ON TEST is extinguished	
NOTES:		
COMMENTS:		____ SAT ____ UNSAT

STEP 33: Check RTGB annunciator APP-005-D3, NIS CHANNEL TEST, EXTINGUISHED (**Step 7.1.26**) STANDARD: Determines APP-005-D3 is extinguished NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 34: Place the ROD STOP BYPASS switch, on the Miscellaneous Control and Indication Panel, in the OPERATE position (**Step 7.1.27**) STANDARD: Places ROD STOP BYPASS switch in the OPERATE position NOTES: **CRITICAL TO RESTORE CHANNEL TO OPERABLE STATUS.** COMMENTS:	**CRITICAL STEP** ____ SAT ____ UNSAT

STEP 35:	NOTE: Entry into the Hagan Rack cabinets will cause annunciator APP-036-L1, PROT RACK DOOR OPEN, to illuminate (**NOTE before Step 7.1.28**)	
STANDARD:	Acknowledges note and anticipates alarm	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
STEP 36:	Place the OVERPOWER ΔT and the OVERTEMPERATURE ΔT Reactor Trip Bistable switches for N-41, located in RACK NO. 1 PROTECTION CH. SET I panel, in the NORMAL position. - BS-412C-1 - BS-412B-1 (**Step 7.1.28**)	
STANDARD:	Informs CRSS that bistables need to be placed in normal condition	
NOTES:	***NOTE: Not considered critical since another operator is performing actions.*** ***CUE: A SPARE OPERATOR WILL PLACE BISTABLES IN NORMAL CONDITION.***	____ SAT
COMMENTS:		____ UNSAT
	SIMULATOR OPERATOR INSTRUCTIONS: Place bistables BS-412C-1 and BS-412B-1 in NORMAL condition by removing MRF BST046 and BST049.	

STEP 37:	Check N-41 bistable status lights on Bistable Status Panel 'B' AND associated RTGB alarms, EXTINGUISHED. - OTΔT Loop 1 TC412C1 - OPΔT Loop 1 TC412B1 - APP-003-B6, OVERPOWER ΔT - APP-003-C6, OVERTEMPERATURE ΔT (**Step 7.1.29**)	
STANDARD:	Verifies bistable status lights and alarms extinguished	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
STEP 38:	Place the DROPPED ROD MODE switch, on NI-41A Power Range "A" drawer, in the NORMAL position (**Step 7.1.30**)	**CRITICAL STEP**
STANDARD:	Places DROPPED ROD MODE switch in the NORMAL position	
NOTES:	**CRITICAL TO RESTORE CHANNEL TO OPERABLE STATUS.**	____ SAT
COMMENTS:		____ UNSAT

STEP 39: Check the DROPPED ROD BYPASS indicator, on NI-41A Power Range "A" drawer, EXTINGUISHED (**Step 7.1.31**) STANDARD: Determines DROPPED ROD BYPASS is extinguished NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 40: Check NIS ROD DROP BYPASS NI-41 status light, on the RTGB, EXTINGUISHED (**Step 7.1.32**) STANDARD: Determines status light is extinguished NOTES: COMMENTS:	____ SAT ____ UNSAT

STEP 41:	Check RTGB annunciator APP-005-D4, NIS TRIP/DROP ROD BYPASS, EXTINGUISHED (**Step 7.1.33**)	
STANDARD:	Determines APP-005-D4 is extinguished	
NOTES:		
COMMENTS:		____ SAT ____ UNSAT
STEP 42:	IF ERFIS point NIN0041A was removed from scan, THEN perform the following: 1. Use the "DR" turn-on code to return ERFIS point NIN0041A to scan (**Step 7.1.34.1**)	
STANDARD:	Restores ERFIS point from scan using "DR" turn-on code	
NOTES:		
COMMENTS:		____ SAT ____ UNSAT

STEP 43:	Check RTGB annunciator APP-005-D6, ΔFLUX WARNING/STATUS, ILLUMINATES within 5 minutes (**Step 7.1.34.2**)	
STANDARD:	Verifies APP-005-D6 alarms within 5 minutes	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
STEP 44:	WHEN APP-005-D6 illuminates, THEN check ERFIS printout indicates channel #1 is returned to service (**Step 7.1.34.3**)	
STANDARD:	Checks ERFIS printout to determine that N-41 is returned to service	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
	END OF TASK	

STOP TIME: ________

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

The unit is operating at 100% power.

All Power Range NIS channels are operable.

OST-007, "Nuclear Instrument Comparator Channel," is scheduled to be performed for NIS channel N-41.

All prerequisites have been completed and the SSO has given permission to perform the test.

INITIATING CUES:

You are to perform OST-007 for NIS channel N-41.

CP&L

C
Continuous Use

CAROLINA POWER & LIGHT COMPANY
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 3
PART 9

OPERATIONS SURVEILLANCE TEST

OST-007

NUCLEAR INSTRUMENTATION COMPARATOR CHANNEL

REVISION 13

SUMMARY OF CHANGES
DCF 1999P0221

STEP	REVISION COMMENTS
Cover Page	Deleted performance frequency. This information provided no benefit since STSS and other procedures (such as GPs) direct the performance of OSTs.
Throughout procedure	Deleted old TECH SPEC references.
2.17	Added new reference.
4.8	Revised step to specify the requirements of TRM 3.9 while a power range channel input to ERFIS is removed from scan.
7.4.3	Deleted the step to place the rods in Manual and replaced it with a step to defeat the power mismatch input into Rod Control. This will prevent the rods from unnecessarily stepping in during performance of the OST while still allowing for rapid response from Rod Control due to a dropped rod or other runback. (CR 98-02352)
7.4.32	As above plus added independent verification to ensure the switch is restored to the OPERATE position.

TABLE OF CONTENTS

1.0 PURPOSE

1.1 This test is to verify the appropriate alarms upon a Power Range Channel deviation of 3% of full power.

2.0 REFERENCES

2.1 Updated FSAR - Section 7.2.1.1.7

2.2 Technical Manual 728-790-18 - Westinghouse P.W.R. Systems Division, Nuclear Instrumentation System

2.3 SD-010, Nuclear Instrumentation Systems

2.4 SD-011, Reactor Protection System

2.5 SD-007, Rod Control System

2.6 RAIL - 90R0131 and RAIL-90R0153

2.7 MMM-006, Calibration Program

2.8 LP-706, Calibration Procedure for Comparator and Rate Portion

2.9 LP-708, Calibration Procedure for Flux Deviation and Miscellaneous Control

2.10 ONS AI 90-074, Nuclear Instrumentation System Assessment

2.11 ITS Table 3.3.1-1

2.12 PLP-037, Conduct of Infrequently Performed Tests or Evolutions

2.13 LP-711, NIS Power Range Channel N41

2.14 LP-712, NIS Power Range Channel N42

2.15 LP-713, NIS Power Range Channel N43

2.16 LP-714, NIS Power Range Channel N44

2.17 CR 98-02352, Runback and Trip During Performance of OST-005

INIT

3.0 PREREQUISITES

3.1 This revision has been verified to be the latest revision available.

__________________ (Print) __________________ __________
Name Signature Date

3.2 The Superintendent Shift Operations has given permission to conduct this test.

______________________________ ____________
Superintendent Shift Operations Date

3.3 All redundant Reactor Protection System channels of the Nuclear Instrumentation System must be in the NORMAL (untripped) mode before starting this test with the plant at power. ______

3.4 The Plant is in a stable condition. ______

4.0 PRECAUTIONS AND LIMITATIONS

4.1 Tests may be performed on only one of the four NIS protection channels at a time. The protection channels not under test must be capable of performing the trip logic (i.e. 2 of 4 power ranges).

4.2 All steps not applicable shall be marked N/A.

4.3 All channels shall have a one-hour warmup period and will have been calibrated and tested according to MMM-006, LP-706, LP-708 and associated procedure LP-711, LP-712, LP-713 or LP-714.

4.4 Refer to ITS Table 3.3.1-1 for Power Range Nuclear Instrumentation applicability and operability requirements.

4.5 An interlock between the DROPPED ROD MODE and OPERATION SELECTOR switches on each drawer requires that the DROPPED ROD MODE switch be in the BYPASS position before testing can be performed on the associated channel. The bypass condition alarms on the RTGB annunciator, NIS TRIP/DROP ROD BYPASS (APP-005-D4) and the particular channel bypassed is indicated on the RTGB.

4.6 Power Range Bistables should have loop width adjustment set to give deadband of approximately 2% full power.

4.7 This procedure has been screened IAW PLP-037 criteria and determined not applicable (N/A) to PLP-037.

4.8 ERFIS calculates the Quadrant Power Tilt Ratio (QPTR) using all four Power Range channels even when a Power Range channel is removed from scan. TRM 3.9B requires logging of individual upper and lower ion chamber currents within one hour of removing a power range channel input to ERFIS from scan. In addition, there are requirements for logging following load changes and control rod motion. Refer to TRM 3.9 for requirements that apply while a channel is removed from scan.

5.0 SPECIAL TOOLS AND EQUIPMENT

None

6.0 ACCEPTANCE CRITERIA

6.1 This test is performed for administrative purposes. The criteria to be used as a guide for acceptance is a comparator bistable setpoint tolerance of between 2.5% - 3.5% of full power.

INIT

7.0 PROCEDURE

7.1 N-41 Comparator Channel Test

7.1.1 Position NIS CHANNEL SELECTOR NR 45 switch to a Power Range not being tested. ______

7.1.2 IF the ERFIS computer is in service, THEN perform the following:

1. Use the "DR" turn-on code to delete ERFIS point NIN0041A from scan. ______

2. Check RTGB annunciator APP-005-D6, △FLUX WARNING/STATUS, ILLUMINATES within 5 minutes. ______

3. WHEN APP-005-D6 illuminates, THEN check ERFIS printout indicates channel #1 is no longer in service. ______

NOTE: An out-of-service Source Range(SR) or Intermediate Range(IR) will cause APP-005-D4, NIS TRIP/DROP ROD BYPASS, annunciator light to be ILLUMINATED.

7.1.3 IF RTGB annunciator APP-005-D4, NIS TRIP/DROP ROD BYPASS, is ILLUMINATED, THEN N/A Step 7.1.6. ______

7.1.4 Place the DROPPED ROD MODE switch, on NI-41A Power Range "A" drawer, in the BYPASS position. ______

7.1.5 Check the DROPPED ROD BYPASS indicator, on NI-41A Power Range "A" drawer, ILLUMINATED. ______

INIT

7.1.6 Check RTGB annunciator APP-005-D4, NIS TRIP/DROP ROD BYPASS, ILLUMINATED. ______

7.1.7 Check NIS ROD DROP BYPASS NI-41 status light, on the RTGB, ILLUMINATED. ______

CAUTION

Access to the Overpower ΔT and Overtemperature ΔT bistable switches for the Power Range channel being tested requires entry into ONLY ONE Hagan Rack cabinet. Entry into more than one Hagan Rack cabinet while repositioning bistable switches for a Power Range channel may result in a reactor trip. (RAIL-90R0131)

NOTE: Entry into the Hagan Rack cabinets will cause annunciator APP-036-L1, PROT RACK DOOR OPEN, to illuminate.

7.1.8 Place the OVERPOWER ΔT and the OVERTEMPERATURE ΔT Reactor Trip Bistable switches for N-41, located in RACK NO. 1 PROTECTION CH. SET I panel, in the TRIPPED position.

- BS-412C-1 ______
- BS-412B-1 ______

7.1.9 Check N-41 bistable status lights on Bistable Status Panel "B" AND associated RTGB alarms, ILLUMINATED.

- OTΔT Loop 1 TC412C1 ______
- OPΔT Loop 1 TC412B1 ______
- APP-003-B6, OVERPOWER ΔT ______
- APP-003-C6, OVERTEMPERATURE ΔT ______

INIT

7.1.10 Place the ROD STOP BYPASS switch, on the NIS Miscellaneous Control and Indication Panel, in the BYPASS PR 41 position. ______

7.1.11 Turn the DETECTOR "A" TEST SIGNAL potentiometer, on NI-41B Power Range "B" drawer, full counter-clockwise (CCW). ______

7.1.12 Turn the DETECTOR "B" TEST SIGNAL potentiometer, on NI-41B Power Range "B" drawer, full counter-clockwise (CCW). ______

7.1.13 Place the DETECTOR "A" RANGE MILLI-AMPS switch, on NI-41B Power Range "B" drawer, in the 0.5 position. ______

7.1.14 Place the DETECTOR "B" RANGE MILLI-AMPS switch, on NI-41B Power Range "B" drawer, in the 0.5 position. ______

7.1.15 Place the OPERATION SELECTOR switch, on NI-41B Power Range "B" drawer, in the DET "A" & "B" position. ______

7.1.16 Check the CHANNEL ON TEST indicator, on NI-41B Power Range "B" drawer, ILLUMINATED. ______

7.1.17 Check RTGB annunciator APP-005-D3, NIS CHANNEL TEST, ILLUMINATED. ______

INIT

NOTE: APP-005-F3, PR UPPER CH HI FLUX DEV/AUTO DEFEAT, and/or APP-005-F4, PR LOWER CH HI FLUX DEV/AUTO DEFEAT, may alarm when the potentiometers are adjusted.

7.1.18 Turn the DETECTOR "A" AND/OR DETECTOR "B" TEST SIGNAL potentiometer(s), on NI-41B Power Range "B" drawer, clockwise (CW) until the CHANNEL DEVIATION indicator, on Comparator and Rate drawer, ILLUMINATES. _______

7.1.19 Record the deviation between N-41 and the lowest Power Range Channel not being tested (2.5% - 3.5%). _____% _______

7.1.20 Check RTGB annunciator APP-005-C3, PR CHANNEL DEV, ILLUMINATED. _______

7.1.21 Turn the DETECTOR "A" AND DETECTOR "B" TEST SIGNAL potentiometer(s), on NI-41B Power Range "B" drawer, full counter-clockwise (CCW). _______

7.1.22 Check RTGB annunciator APP-005-C3, PR CHANNEL DEV, EXTINGUISHED. _______

7.1.23 Check the CHANNEL DEVIATION indicator, on Comparator and Rate drawer, EXTINGUISHED. _______

INIT

7.1.24 Place the OPERATION SELECTOR switch, on NI-41B Power Range "B" drawer, in the NORMAL position. ______

7.1.25 Check the CHANNEL ON TEST indicator, on NI-41B Power Range "B" drawer, EXTINGUISHED. ______

7.1.26 Check RTGB annunciator APP-005-D3, NIS CHANNEL TEST, EXTINGUISHED. ______

7.1.27 Place the ROD STOP BYPASS switch, on the Miscellaneous Control and Indication Panel, in the OPERATE position. ______

NOTE: Entry into the Hagan Rack cabinets will cause annunciator APP-036-L1, PROT RACK DOOR OPEN, to illuminate.

7.1.28 Place the OVERPOWER ΔT and OVERTEMPERATURE ΔT Reactor Trip Bistable switches for N-41, located in RACK NO. 1 PROTECTION CH. SET I panel, to the NORMAL position. (RAIL-90R0153).

- BS-412C-1 ______
- BS-412B-1 ______

7.1.29 Check N-41 bistable status lights on Bistable Status Panel "B" AND associated RTGB alarms, EXTINGUISHED.

- OTΔT Loop 1 TC412C1 ______
- OPΔT Loop 1 TC412B1 ______
- APP-003-B6, OVERPOWER ΔT ______
- APP-003-C6, OVERTEMPERATURE ΔT ______

INIT

7.1.30 Place the DROPPED ROD MODE switch, on NI-41A Power Range "A" drawer, in the NORMAL position. ______

7.1.31 Check the DROPPED ROD BYPASS indicator, on NI-41A Power Range "A" drawer, EXTINGUISHED. ______

7.1.32 Check NIS ROD DROP BYPASS NI-41 status light, on the RTGB, EXTINGUISHED. ______

7.1.33 Check RTGB annunciator APP-005-D4, NIS TRIP/DROP ROD BYPASS, EXTINGUISHED. (N/A this step if any SR or IR NIS channel is out-of-service.) ______

7.1.34 IF ERFIS point NIN0041A was removed from scan, THEN perform the following:

1. Use the "DR" turn-on code to return ERFIS point NIN0041A to scan. ______

2. Check RTGB annunciator APP-005-D6, ΔFLUX WARNING/STATUS, ILLUMINATES within 5 minutes. ______

3. WHEN APP-005-D6 illuminates, THEN check ERFIS printout indicates channel #1 is returned to service. ______

INIT

7.2 N-42 Comparator Channel Test

7.2.1 Position NIS CHANNEL SELECTOR NR 45 switch to a Power Range not being tested. ______

7.2.2 IF the ERFIS computer is in service, THEN perform the following:

1. Use the "DR" turn-on code to delete ERFIS point NIN0042A from scan. ______

2. Check RTGB annunciator APP-005-D6, △FLUX WARNING/STATUS, ILLUMINATES within 5 minutes. ______

3. WHEN APP-005-D6 illuminates, THEN check ERFIS printout indicates channel #2 is no longer in service. ______

NOTE: An out-of-service Source Range(SR) or Intermediate Range(IR) will cause APP-005-D4, NIS TRIP/DROP ROD BYPASS, annunciator light to be ILLUMINATED.

7.2.3 IF RTGB annunciator APP-005-D4, NIS TRIP/DROP ROD BYPASS, is ILLUMINATED, THEN N/A Step 7.2.6. ______

7.2.4 Place the DROPPED ROD MODE switch, on NI-42A Power Range "A" drawer, in the BYPASS position. ______

7.2.5 Check the DROPPED ROD BYPASS indicator, on NI-42A Power Range "A" drawer, ILLUMINATED. ______

INIT

7.2.6 Check RTGB annunciator APP-005-D4, NIS TRIP/DROP ROD BYPASS, ILLUMINATED. ______

7.2.7 Check NIS ROD DROP BYPASS NI-42 status light, on the RTGB, ILLUMINATED. ______

CAUTION

Access to the Overpower ΔT and Overtemperature ΔT bistable switches for the Power Range channel being tested requires entry into ONLY ONE Hagan Rack cabinet. Entry into more than one Hagan Rack cabinet while repositioning bistable switches for a Power Range channel may result in a reactor trip. (RAIL-90R0131)

NOTE: Entry into the Hagan Rack cabinets will cause annunciator APP-036-L1, PROT RACK DOOR OPEN, to illuminate.

7.2.8 Place the OVERPOWER ΔT and the OVERTEMPERATURE ΔT Reactor Trip Bistable switches for N-42, located in RACK NO. 11 PROTECTION CH. SET II panel, in the TRIPPED position.

- BS-422C-1 ______
- BS-422B-1 ______

7.2.9 Check N-42 bistable status lights on Bistable Status Panel "B" AND associated RTGB alarms, ILLUMINATED.

- OTΔT Loop 2 TC422C1 ______
- OPΔT Loop 2 TC422B1 ______
- APP-003-B6, OVERPOWER ΔT ______
- APP-003-C6, OVERTEMPERATURE ΔT ______

INIT

7.2.10 Place the ROD STOP BYPASS switch, on the NIS Miscellaneous Control and Indication Panel, in the BYPASS PR 42 position. _______

7.2.11 Turn the DETECTOR "A" TEST SIGNAL potentiometer, on NI-42B Power Range "B" drawer, full counter-clockwise (CCW). _______

7.2.12 Turn the DETECTOR "B" TEST SIGNAL potentiometer, on NI-42B Power Range "B" drawer, full counter-clockwise (CCW). _______

7.2.13 Place the DETECTOR "A" RANGE MILLI-AMPS switch, on NI-42B Power Range "B" drawer, in the 0.5 position. _______

7.2.14 Place the DETECTOR "B" RANGE MILLI-AMPS switch, on NI-42B Power Range "B" drawer, in the 0.5 position. _______

7.2.15 Place the OPERATION SELECTOR switch, on NI-42B Power Range "B" drawer, in the DET "A" & "B" position. _______

7.2.16 Check the CHANNEL ON TEST indicator, on NI-42B Power Range "B" drawer, ILLUMINATED. _______

7.2.17 Check RTGB annunciator APP-005-D3, NIS CHANNEL TEST, ILLUMINATED. _______

INIT

> **NOTE:** APP-005-F3, PR UPPER CH HI FLUX DEV/AUTO DEFEAT, and/or APP-005-F4, PR LOWER CH HI FLUX DEV/AUTO DEFEAT, may alarm when the potentiometers are adjusted.

7.2.18 Turn the DETECTOR "A" AND/OR DETECTOR "B" TEST SIGNAL potentiometer(s), on NI-42B Power Range "B" drawer, clockwise (CW) until the CHANNEL DEVIATION indicator, on Comparator and Rate drawer, ILLUMINATES. ______

7.2.19 Record the deviation between N-42 and the lowest Power Range Channel not being tested (2.5% - 3.5%). ____% ______

7.2.20 Check RTGB annunciator APP-005-C3, PR CHANNEL DEV, ILLUMINATED. ______

7.2.21 Turn the DETECTOR "A" AND DETECTOR "B" TEST SIGNAL potentiometer(s), on NI-42B Power Range "B" drawer, full counter-clockwise (CCW). ______

7.2.22 Check RTGB annunciator APP-005-C3, PR CHANNEL DEV, EXTINGUISHED. ______

7.2.23 Check the CHANNEL DEVIATION indicator, on Comparator and Rate drawer, EXTINGUISHED. ______

INIT

7.2.24 Place the OPERATION SELECTOR switch, on NI-42B Power Range "B" drawer, in the NORMAL position. _______

7.2.25 Check the CHANNEL ON TEST indicator, on NI-42B Power Range "B" drawer, EXTINGUISHED. _______

7.2.26 Check RTGB annunciator APP-005-D3, NIS CHANNEL TEST, EXTINGUISHED. _______

7.2.27 Place the ROD STOP BYPASS switch, on the Miscellaneous Control and Indication Panel, in the OPERATE position. _______

NOTE: Entry into the Hagan Rack cabinets will cause annunciator APP-036-L1, PROT RACK DOOR OPEN, to illuminate.

7.2.28 Place the OVERPOWER ΔT and OVERTEMPERATURE ΔT Reactor Trip Bistable switches for N-42, located in RACK NO. 11 PROTECTION CH. SET II panel, to the NORMAL position. (RAIL-90R0153).

- BS-422C-1 _______
- BS-422B-1 _______

7.2.29 Check N-42 bistable status lights on Bistable Status Panel "B" AND associated RTGB alarms, EXTINGUISHED.

- OTΔT Loop 2 TC422C1 _______
- OPΔT Loop 2 TC422B1 _______
- APP-003-B6, OVERPOWER ΔT _______
- APP-003-C6, OVERTEMPERATURE ΔT _______

INIT

7.2.30 Place the DROPPED ROD MODE switch, on NI-42A Power Range "A" drawer, in the NORMAL position. ______

7.2.31 Check the DROPPED ROD BYPASS indicator, on NI-42A Power Range "A" drawer, EXTINGUISHED. ______

7.2.32 Check NIS ROD DROP BYPASS NI-42 status light, on the RTGB, EXTINGUISHED. ______

7.2.33 Check RTGB annunciator APP-005-D4, NIS TRIP/DROP ROD BYPASS, EXTINGUISHED. (N/A this step if any SR or IR NIS channel is out-of-service.) ______

7.2.34 IF ERFIS point NIN0042A was removed from scan, THEN perform the following:

1. Use the "DR" turn-on code to return ERFIS point NIN0042A to scan. ______

2. Check RTGB annunciator APP-005-D6, ΔFLUX WARNING/STATUS, ILLUMINATES within 5 minutes. ______

3. WHEN APP-005-D6 illuminates, THEN check ERFIS printout indicates channel #2 is returned to service. ______

INIT

7.3 N-43 Comparator Channel Test

7.3.1 Position NIS CHANNEL SELECTOR NR 45 switch to a Power Range not being tested. ______

7.3.2 IF the ERFIS computer is in service, THEN perform the following:

1. Use the "DR" turn-on code to delete ERFIS point NIN0043A from scan. ______

2. Check RTGB annunciator APP-005-D6, △FLUX WARNING/STATUS, ILLUMINATES within 5 minutes. ______

3. WHEN APP-005-D6 illuminates, THEN check ERFIS printout indicates channel #3 is no longer in service. ______

NOTE: An out-of-service Source Range(SR) or Intermediate Range(IR) will cause APP-005-D4, NIS TRIP/DROP ROD BYPASS, annunciator light to be ILLUMINATED.

7.3.3 IF RTGB annunciator APP-005-D4, NIS TRIP/DROP ROD BYPASS, is ILLUMINATED, THEN N/A Step 7.3.6. ______

7.3.4 Place the DROPPED ROD MODE switch, on NI-43A Power Range "A" drawer, in the BYPASS position. ______

7.3.5 Check the DROPPED ROD BYPASS indicator, on NI-43A Power Range "A" drawer, ILLUMINATED. ______

INIT

7.3.6 Check RTGB annunciator APP-005-D4, NIS TRIP/DROP ROD BYPASS, ILLUMINATED. _______

7.3.7 Check NIS ROD DROP BYPASS NI-43 status light, on the RTGB, ILLUMINATED. _______

CAUTION

Access to the Overpower ΔT and Overtemperature ΔT bistable switches for the Power Range channel being tested requires entry into ONLY ONE Hagan Rack cabinet. Entry into more than one Hagan Rack cabinet while repositioning bistable switches for a Power Range channel may result in a reactor trip. (RAIL-90R0131)

NOTE: Entry into the Hagan Rack cabinets will cause annunciator APP-036-L1, PROT RACK DOOR OPEN, to illuminate.

7.3.8 Place the OVERPOWER ΔT and the OVERTEMPERATURE ΔT Reactor Trip Bistable switches for N-43, located in RACK NO. 14 PROTECTION CH. SET III panel, in the TRIPPED position.

- BS-432C-1 _______
- BS-432B-1 _______

7.3.9 Check N-43 bistable status lights on Bistable Status Panel "B" AND associated RTGB alarms, ILLUMINATED.

- OTΔT Loop 3 TC432C1 _______
- OPΔT Loop 3 TC432B1 _______
- APP-003-B6, OVERPOWER ΔT _______
- APP-003-C6, OVERTEMPERATURE ΔT _______

INIT

7.3.10	Place the ROD STOP BYPASS switch, on the NIS Miscellaneous Control and Indication Panel, in the BYPASS PR 43 position.	______
7.3.11	Turn the DETECTOR "A" TEST SIGNAL potentiometer, on NI-43B Power Range "B" drawer, full counter-clockwise (CCW).	______
7.3.12	Turn the DETECTOR "B" TEST SIGNAL potentiometer, on NI-43B Power Range "B" drawer, full counter-clockwise (CCW).	______
7.3.13	Place the DETECTOR "A" RANGE MILLI-AMPS switch, on NI-43B Power Range "B" drawer, in the 0.5 position.	______
7.3.14	Place the DETECTOR "B" RANGE MILLI-AMPS switch, on NI-43B Power Range "B" drawer, in the 0.5 position.	______
7.3.15	Place the OPERATION SELECTOR switch, on NI-43B Power Range "B" drawer, in the DET "A" & "B" position.	______
7.3.16	Check the CHANNEL ON TEST indicator, on NI-43B Power Range "B" drawer, ILLUMINATED.	______
7.3.17	Check RTGB annunciator APP-005-D3, NIS CHANNEL TEST, ILLUMINATED.	______

INIT

NOTE: APP-005-F3, PR UPPER CH HI FLUX DEV/AUTO DEFEAT, and/or APP-005-F4, PR LOWER CH HI FLUX DEV/AUTO DEFEAT, may alarm when the potentiometers are adjusted.

7.3.18 Turn the DETECTOR "A" AND/OR DETECTOR "B" TEST SIGNAL potentiometer(s), on NI-43B Power Range "B" drawer, clockwise (CW) until the CHANNEL DEVIATION indicator, on Comparator and Rate drawer, ILLUMINATES. ______

7.3.19 Record the deviation between N-43 and the lowest Power Range Channel not being tested (2.5% - 3.5%). ____% ______

7.3.20 Check RTGB annunciator APP-005-C3, PR CHANNEL DEV, ILLUMINATED. ______

7.3.21 Turn the DETECTOR "A" AND DETECTOR "B" TEST SIGNAL potentiometer(s), on NI-43B Power Range "B" drawer, full counter-clockwise (CCW). ______

7.3.22 Check RTGB annunciator APP-005-C3, PR CHANNEL DEV, EXTINGUISHED. ______

7.3.23 Check the CHANNEL DEVIATION indicator, on Comparator and Rate drawer, EXTINGUISHED. ______

INIT

7.3.24 Place the OPERATION SELECTOR switch, on NI-43B Power Range "B" drawer, in the NORMAL position. _______

7.3.25 Check the CHANNEL ON TEST indicator, on NI-43B Power Range "B" drawer, EXTINGUISHED. _______

7.3.26 Check RTGB annunciator APP-005-D3, NIS CHANNEL TEST, EXTINGUISHED. _______

7.3.27 Place the ROD STOP BYPASS switch, on the Miscellaneous Control and Indication Panel, in the OPERATE position. _______

NOTE: Entry into the Hagan Rack cabinets will cause annunciator APP-036-L1, PROT RACK DOOR OPEN, to illuminate.

7.3.28 Place the OVERPOWER ΔT and OVERTEMPERATURE ΔT Reactor Trip Bistable switches for N-43, located in RACK NO. 14 PROTECTION CH. SET III panel, to the NORMAL position. (RAIL-90R0153).

- BS-432C-1 _______
- BS-432B-1 _______

7.3.29 Check N-43 bistable status lights on Bistable Status Panel "B" AND associated RTGB alarms, EXTINGUISHED.

- OTΔT Loop 3 TC432C1 _______
- OPΔT Loop 3 TC432B1 _______
- APP-003-B6, OVERPOWER ΔT _______
- APP-003-C6, OVERTEMPERATURE ΔT _______

INIT

7.3.30 Place the DROPPED ROD MODE switch, on NI-43A Power Range "A" drawer, in the NORMAL position. ______

7.3.31 Check the DROPPED ROD BYPASS indicator, on NI-43A Power Range "A" drawer, EXTINGUISHED. ______

7.3.32 Check NIS ROD DROP BYPASS NI-43 status light, on the RTGB, EXTINGUISHED. ______

7.3.33 Check RTGB annunciator APP-005-D4, NIS TRIP/DROP ROD BYPASS, EXTINGUISHED. (N/A this step if any SR or IR NIS channel is out-of-service.) ______

7.3.34 IF ERFIS point NIN0043A was removed from scan, THEN perform the following:

1. Use the "DR" turn-on code to return ERFIS point NIN0043A to scan. ______

2. Check RTGB annunciator APP-005-D6, ΔFLUX WARNING/STATUS, ILLUMINATES within 5 minutes. ______

3. WHEN APP-005-D6 illuminates, THEN check ERFIS printout indicates channel #3 is returned to service. ______

INIT

7.4 N-44 Comparator Channel Test

7.4.1 Position NIS CHANNEL SELECTOR NR 45 switch to a Power Range not being tested. ______

7.4.2 IF the ERFIS computer is in service, THEN perform the following:

1. Use the "DR" turn-on code to delete ERFIS point NIN0044A from scan. ______

2. Check RTGB annunciator APP-005-D6, △FLUX WARNING/STATUS, ILLUMINATES within 5 minutes. ______

3. WHEN APP-005-D6 illuminates, THEN check ERFIS printout indicates channel #4 is no longer in service. ______

7.4.3 Place the 1/QM-408 switch located in Rack No. 28 in the POWER MISMATCH DEFEAT position. (CR 98-02352) ______

NOTE: An out-of-service Source Range(SR) or Intermediate Range(IR) will cause APP-005-D4, NIS TRIP/DROP ROD BYPASS, annunciator light to be ILLUMINATED.

7.4.4 IF RTGB annunciator APP-005-D4, NIS TRIP/DROP ROD BYPASS, is ILLUMINATED, THEN N/A Step 7.4.7. ______

7.4.5 Place the DROPPED ROD MODE switch, on NI-44A Power Range "A" drawer, in the BYPASS position. ______

INIT

7.4.6	Check the DROPPED ROD BYPASS indicator, on NI-44A Power Range "A" drawer, ILLUMINATED.	_______
7.4.7	Check RTGB annunciator APP-005-D4, NIS TRIP/DROP ROD BYPASS, ILLUMINATED.	_______
7.4.8	Check NIS ROD DROP BYPASS NI-44 status light, on the RTGB, ILLUMINATED.	_______
7.4.9	Place the ROD STOP BYPASS switch, on the NIS Miscellaneous Control and Indication Panel, in the BYPASS PR 44 position.	_______
7.4.10	Turn the DETECTOR "A" TEST SIGNAL potentiometer, on NI-44B Power Range "B" drawer, full counter-clockwise (CCW).	_______
7.4.11	Turn the DETECTOR "B" TEST SIGNAL potentiometer, on NI-44B Power Range "B" drawer, full counter-clockwise (CCW).	_______
7.4.12	Place the DETECTOR "A" RANGE MILLI-AMPS switch, on NI-44B Power Range "B" drawer, in the 0.5 position.	_______
7.4.13	Place the DETECTOR "B" RANGE MILLI-AMPS switch, on NI-44B Power Range "B" drawer, in the 0.5 position.	_______

INIT

7.4.14 Place the OPERATION SELECTOR switch, on NI-44B Power Range "B" drawer, in the DET "A" & "B" position. ______

7.4.15 Check the CHANNEL ON TEST indicator, on NI-44B Power Range "B" drawer, ILLUMINATED. ______

7.4.16 Check RTGB annunciator APP-005-D3, NIS CHANNEL TEST, ILLUMINATED. ______

> **NOTE:** APP-005-F3, PR UPPER CH HI FLUX DEV/AUTO DEFEAT, and/or APP-005-F4, PR LOWER CH HI FLUX DEV/AUTO DEFEAT, may alarm when the potentiometers are adjusted.

7.4.17 Turn the DETECTOR "A" AND/OR DETECTOR "B" TEST SIGNAL potentiometer(s), on NI-44B Power Range "B" drawer, clockwise (CW) until the CHANNEL DEVIATION indicator, on Comparator and Rate drawer, ILLUMINATES. ______

7.4.18 Record the deviation between N-44 and the lowest Power Range Channel not being tested (2.5% - 3.5%). ____% ______

7.4.19 Check RTGB annunciator APP-005-C3, PR CHANNEL DEV, ILLUMINATED. ______

INIT

7.4.20 Turn the DETECTOR "A" AND DETECTOR "B" TEST SIGNAL potentiometer(s), on NI-44B Power Range "B" drawer, full counter-clockwise (CCW). _______

7.4.21 Check RTGB annunciator APP-005-C3, PR CHANNEL DEV, EXTINGUISHED. _______

7.4.22 Check the CHANNEL DEVIATION indicator, on Comparator and Rate drawer, EXTINGUISHED. _______

7.4.23 Place the OPERATION SELECTOR switch, on NI-44B Power Range "B" drawer, in the NORMAL position. _______

7.4.24 Check the CHANNEL ON TEST indicator, on NI-44B Power Range "B" drawer, EXTINGUISHED. _______

7.4.25 Check RTGB annunciator APP-005-D3, NIS CHANNEL TEST, EXTINGUISHED. _______

7.4.26 Place the ROD STOP BYPASS switch, on the Miscellaneous Control and Indication Panel, in the OPERATE position. _______

INIT VERI

7.4.27 Place the DROPPED ROD MODE switch, on NI-44A Power Range "A" drawer, in the NORMAL position. ______

7.4.28 Check the DROPPED ROD BYPASS indicator, on NI-44A Power Range "A" drawer, EXTINGUISHED. ______

7.4.29 Check NIS ROD DROP BYPASS NI-44 status light, on the RTGB, EXTINGUISHED. ______

7.4.30 Check RTGB annunciator APP-005-D4, NIS TRIP/DROP ROD BYPASS, EXTINGUISHED. (N/A this step if any SR or IR NIS channel is out-of-service.) ______

7.4.31 IF ERFIS point NIN0044A was removed from scan, THEN perform the following:

1. Use the "DR" turn-on code to return ERFIS point NIN0044A to scan. ______

2. Check RTGB annunciator APP-005-D6, ΔFLUX WARNING/STATUS, ILLUMINATES within 5 minutes. ______

3. WHEN APP-005-D6 illuminates, THEN check ERFIS printout indicates channel #4 is returned to service. ______

7.4.32 Place the 1/QM-408 switch located in Rack No. 28 in the OPERATE position. (CR 98-02352) ______ ______

8.0 **ATTACHMENTS**

8.1 Surveillance Test Procedure Certification and Review Form

ATTACHMENT 8.1
Page 1 of 1

SURVEILLANCE TEST PROCEDURE CERTIFICATION AND REVIEW FORM

Scheduled / Unscheduled (Circle one)

(If unscheduled, state reason for test and the page numbers included in partial test)

____

____

____

	Initials	Name (Print)	Date
Test Performed by			

Test Complete: Date __________ Time __________

Test Satisfactory: Yes / No (Circle one)

Reviewed by ________________________ Date __________
Shift Technical Advisor

Comments: (Required if results were unsatisfactory) ____________________

____

____

____

____

Approved by ________________________ Date __________
Superintendent Shift Operations

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM COM-B.1.g

Transfer to Long Term Recirculation (EPP-10)

CANDIDATE: ______________________________

EXAMINER: ______________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task: Transfer to Long Term Recirculation (EPP-10)

Alternate Path: Hot Leg Injection valve SI-866A fails to open, requiring alternate injection path.

Facility JPM #: CR-081

K/A Rating: 006A4.05 Importance: SRO 3.9 RO 3.8

K/A Statement: Ability to manually operate and/or monitor in the control room: Transfer of ECCS flowpaths prior to recirculation

Task Standard: Long term recirculation mode has been established per EPP-010.

Preferred Evaluation Location: Simulator X In Plant ____

Preferred Evaluation Method: Perform X Simulate ____

References: EPP-010, Transfer to Long Term Recirculation

Validation Time: 15 minutes Time Critical: NO

Candidate: ____________________

Time Start: ________ Time Finish: ______

Performance Time: ______ minutes

Performance Rating: SAT ______ UNSAT ______

Comments: ____________________

____

Examiner: ____________________ Date: ______

Signature

Tools/Equipment/Procedures Needed:

EPP-010
Keys for SI-866A & B

SIMULATOR OPERATOR INSTRUCTIONS:
1) Reset simulator to IC-28.
2) Enter OVR SIS for SI-866A, Close to ON and open to OFF.
3) FREEZE the simulator.
4) WHEN DIRECTED by JPM instructions, open breaker for RHR-759A and open breaker for RHR-759B by inserting MRF EPS195 and MRF EPS243 to RACK_OUT, respectively.

READ TO OPERATOR

DIRECTION TO CANDIDATE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

An RCS large break LOCA occurred 11 hours ago.

Cold leg recirculation has been established per EPP-009, "Transfer to Cold Leg Recirculation."

EPP-Foldout B is in effect.

INITIATING CUES:

You are to place the unit in long term recirculation in accordance with EPP-010, "Transfer to Long Term Recirculation."

START TIME: ________

STEP 1: Locates proper procedure and required information. STANDARD: Locates EPP-010 NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 2: Open Foldout B (**Step 1**) STANDARD: Opens Foldout B, reviews, and determines no actions required NOTES: COMMENTS:	____ SAT ____ UNSAT

STEP 3:	Determine the Needed RHR Alignment As Follows: a. Check RHR System Alignment - IN PIGGY-BACK MODE (**Step 2.a**)	
STANDARD:	Determines RHR NOT aligned for Piggy-Back Mode due to SI-863A & B being closed and goes to RNO for Step 2.a	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
STEP 4:	Observe the CAUTION prior to Step 4 and Go To Step 4 (**Step 2.a RNO**)	
STANDARD:	Goes to caution before Step 4	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 5: CAUTION: Steps 4 through 7 must be performed without delay to minimize the time without flow through the core (**Caution before Step 4**) STANDARD: Acknowledges caution NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 6: Perform The Following: a. Verify the RHR PUMPs - ALL STOPPED (**Step 4.a**) STANDARD: Determines RHR pumps NOT stopped and stops running RHR pump by placing switch in STOP position and verifies pump stopped by breaker indication and flow indication NOTES: **CRITICAL TO STOP PUMP TO ALLOW ALIGNING FOR LONG TERM RECIRCULATION.** COMMENTS:	**CRITICAL STEP** ____ SAT ____ UNSAT

STEP 7:	Verify RHR HX DISCH Valves - CLOSED - RHR-759A - RHR-759B (**Step 4.b**)	**CRITICAL STEP**
STANDARD:	Determines RHR HX discharge valves both open, places switches for RHR-759A & B to CLOSE, and verifies valves close by postion indication	
NOTES:	**CRITICAL TO ENSURE ADEQUATE SUCTION SOURCE TO SI PUMPS.**	____ SAT
COMMENTS:		____ UNSAT
STEP 8:	Verify RHR LOOP RECIRC Valves - OPEN - SI-863A - SI-863B (**Step 4.c**)	**CRITICAL STEP**
STANDARD:	Determines SI-863A & B closed, places switches for SI-863A & B to OPEN and verifies valves open by position indication	
NOTES:	**CRITICAL TO PROVIDE SUCTION SOURCE FOR SI PUMPS.**	____ SAT
COMMENTS:		____ UNSAT

STEP 9:	CAUTION: Opening SI-866A AND SI-866B, HOT LEG INJs, with only one SI Pump running will cause pump runout (**Caution before Step 5**)	
STANDARD:	Acknowledges caution	
NOTES:		____ SAT ____ UNSAT
COMMENTS:		
STEP 10:	Verify The Following Valves Aligned For Hot Leg Recirculation: a. SI-866A, LOOP 3 HOT LEG INJ - OPEN (**Step 5.a**)	
STANDARD:	Determines SI-866A is closed, places switch for SI-866A in OPEN position, BUT determines valve does NOT open and goes to Step 5.a.RNO	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 11:	Open SI-866B, LOOP 2 HOT LEG INJ (**Step 5.a RNO**)	**CRITICAL STEP**
STANDARD:	Places switch for SI-866B in OPEN position and verifies valve opens by position indication	
NOTES:	**CRITICAL TO PROVIDE FLOW PATH FOR HOT LEG RECIRCULATION.**	____ SAT
COMMENTS:		____ UNSAT
STEP 12:	BIT OUTLET Valves - CLOSED - SI-870A - SI-870B (**Step 5.b**)	**CRITICAL STEP**
STANDARD:	Places switches for SI-870A & B to CLOSED position and verifies valves close by position indication	
NOTES:	**CRITICAL TO PROVIDE FLOW PATH FOR HOT LEG RECIRCULATION.**	____ SAT
COMMENTS:		____ UNSAT

STEP 13:	CAUTION: Valves RHR-759A and RHR-759B, RHR HX DISCHs, are closed. The RHR Pumps will run dead-headed and are subject to damage until the SI Pumps are started (**Caution before Step 6**)	
STANDARD:	Acknowledges caution	
NOTES:		____ SAT ____ UNSAT
COMMENTS:		
STEP 14:	Establish Hot Leg Recirculation Flow As Follows: a. Check RHR-759A - CLOSED (**Step 6.a**)	
STANDARD:	Verifies RHR-759A is closed by position indication	
NOTES:		____ SAT ____ UNSAT
COMMENTS:		

STEP 15:	Open SI-863A, RHR LOOP RECIRC (**Step 6.b**)	
STANDARD:	Verifies SI-863A is open by position indication	
NOTES:	***NOTE: SI-863A & B were opened in Step 4.c.***	____ SAT
COMMENTS:		____ UNSAT
STEP 16:	Start RHR PUMP A (**Step 6.c**)	**CRITICAL STEP**
STANDARD:	Places switch for RHR Pump 'A' in START position and verifies pump starts by breaker indication and flow indication	
NOTES:	**CRITICAL TO PROVIDE SUCTION SOURCE FOR SI PUMPS.**	____ SAT
COMMENTS:		____ UNSAT

STEP 17:	Start One SI Pump On Each Available Emergency Bus (**Step 7**)	**CRITICAL STEP**
STANDARD:	Determines both emergency buses are available, places switches for both SI pumps to start, and verifies pump starts by breaker indication and flow indication	
NOTES:	**CRITICAL STEP TO PROVIDE FLOW THROUGH HOT LEG RECIRCULATION LINE.**	____ SAT ____ UNSAT
COMMENTS:		
STEP 18:	Check Indicated Flow On The Appropriate Flow Meters: - FI-940, SI HOT LEG HEADER FLOW - FI-933, SI LOOP 2 HOT LEG FLOW (**Step 8**)	
STANDARD:	Determines SI-866B is open and verifies flow indication on FI-940 and FI-933	
NOTES:		____ SAT ____ UNSAT
COMMENTS:		

STEP 19:	Determine If Flow Should Be Established To Cold Legs As Follows: a. Check RCS pressure - LESS THAN 125 PSIG (**Step 9.a**)	
STANDARD:	Determines RCS pressure is less than 125 psig and that cold leg recirculation flow should be established	
NOTES:		____ SAT ____ UNSAT
COMMENTS:		
STEP 20:	Check ALL of the below components - OPERABLE - FI-605, RHR TOTAL FLOW - RHR-759A & B, RHR HEAT EXCHANGER OUTLETs - SI-863A & B, RHR LOOP RECIRCs - RHR Pumps A & B (**Step 9.b**)	
STANDARD:	Determines all components operable by light indications and no known deficiencies	
NOTES:		____ SAT ____ UNSAT
COMMENTS:		

STEP 21:	Align For Cold Leg Injection As Follows: a. Establish communications with operators stationed at the breakers for RHR HEAT EXCHANGER OUTLETs: - RHR-759A (MCC-5, CMPT 14C) - RHR-759B (MCC-6, CMPT 13C) (**Step 10.a**)	
STANDARD:	Directs two operators to go to breakers and contact Control Room	
NOTES:	***CUE: OPERATORS ARE STANDING BY BREAKERS.***	____ SAT ____ UNSAT
COMMENTS:		
STEP 22:	Start the second RHR PUMP (**Step 10.b**)	**CRITICAL STEP**
STANDARD:	Places switch for RHR pump 'B' to START and verifies pump starts by breaker indication	
NOTES:	**CRITICAL TO ESTABLISH ADEQUATE FLOW FOR BOTH HOT LEG AND COLD LEG RECIRCULATION.**	____ SAT ____ UNSAT
COMMENTS:		

STEP 23:	Verify BOTH RHR LOOP RECIRC Valves - OPEN - SI-863A - SI-863B (**Step 10.c**)	
STANDARD:	Verifies SI-863A & B are open by position indication	
NOTES:	***NOTE: Both valves were opened previously.***	____ SAT ____ UNSAT
COMMENTS:		
STEP 24:	Open RHR-759A, RHR HX A DISCH AND locally open RHR-759A Breaker when RHR flow on FI-605 indicates 1200 gpm (**Step 10.d**)	**CRITICAL STEP**
STANDARD:	Places switch for RHR-759A in OPEN position, verifies valve begins stroking open, and directs local operator to open RHR-759A breaker when FI-605 indicates 1200 gpm	
NOTES:	**CRITICAL TO OPEN VALVE TO ESTABLISH COLD LEG FLOW AND CRITICAL TO DIRECT BREAKER OPENING TO PREVENT RHR PUMP RUNOUT.**	____ SAT ____ UNSAT
COMMENTS:		
	SIMULATOR OPERATOR INSTRUCTIONS: Open breaker for RHR-759A when directed by candidate by inserting MRF EPS195 to RACK_OUT.	

STEP 25:	Open RHR-759B, RHR HX B DISCH AND locally open RHR-759B breaker when RHR flow on FI-605 indicates 2300 (**Step 10.e**)	**CRITICAL STEP**
STANDARD:	Places switch for RHR-759B in OPEN position, verifies valve begins stroking open, and directs local operator to open RHR-759B breaker when FI-605 indicates 2300 gpm	
NOTES:	**CRITICAL TO OPEN VALVE TO ESTABLISH COLD LEG FLOW AND CRITICAL TO DIRECT BREAKER OPENING TO PREVENT RHR PUMP RUNOUT.**	____ SAT ____ UNSAT
COMMENTS:		
	SIMULATOR OPERATOR INSTRUCTIONS: Open breaker for RHR-759B when directed by candidate by inserting MRF EPS243 to RACK_OUT.	
STEP 26:	Go To Step 15 (**Step 10.f**)	
STANDARD:	Goes to Step 15	
NOTES:		____ SAT ____ UNSAT
COMMENTS:		

STEP 27: Contact Plant Operations Staff To Evaluate Long Term Plant Status (**Step 15**) STANDARD: Informs CRSS that Long Term Recirculation is established and an evaluation of Long Term Plant Status should be performed NOTES: COMMENTS: ***END OF TASK***	____ SAT ____ UNSAT

STOP TIME: ________

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

An RCS large break LOCA occurred 11 hours ago.

Cold leg recirculation has been established per EPP-009, "Transfer to Cold Leg Recirculation."

EPP-Foldout B is in effect.

INITIATING CUES:

You are to place the unit in long term recirculation in accordance with EPP-010, "Transfer to Long Term Recirculation."

CONTINUOUS USE

CAROLINA POWER & LIGHT COMPANY

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 3

PART 4

END PATH PROCEDURE

EPP-10

TRANSFER TO LONG TERM RECIRCULATION

REVISION 14

Effective Date __________

RECOMMENDED BY: ______________________________ __________
Procedure Sponsor Date

APPROVED BY: ______________________________ __________
Manager - Operations Date

LIST OF EFFECTIVE PAGES

EFFECTIVE PAGES	REVISION
Cover Sheet	14
LEP	14
3 through 11	14

Summary of Changes

Step 2: New step added to accomodate potential for RHR to already be in the piggy-back mode. Moved the CV Spray portion of step 3 into this step.

Step 3 and Caution: New step and caution added if Piggy-Back Mode already in progress all that is needed is alignment of the valves for hotleg injection. Added potential for only one SI Pump running so that pumps are stopped while cycling valves.

C4: New caution added to warn of the hazzard for no-flow which will occur in the subsequent steps.

Step 9: Added all valves and pumps needed for both hot and cold leg recirculation flow to the operability question.

Step 10: Added new substep to verify both SI-863 valves open to balance flow.

Steps 12 and 14:Added potential for only one SI Pump running so that pumps are stopped while cycling valves.

Purpose and Entry Conditions

(Page 1 of 1)

1. PURPOSE

   This procedure provides the necessary instructions for transferring the Safety Injection system to long term recirculation.

2. ENTRY CONDITIONS

   Path-1, approximately 11 hours after a primary loss of coolant has occurred.

- END -

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED
1.	Open Foldout B	
2.	Determine the Needed RHR Alignment As Follows:	
	a. Check RHR System Alignment - IN PIGGY-BACK MODE	a. Observe the <u>CAUTION</u> prior to Step 4 and Go To Step 4.
	b. Check any CV Spray Pump - IN SERVICE	b. Observe the <u>CAUTION</u> prior to Step 3 and Go To Step 3.
	c. Stop the operating CV Spray Pump	
	d. Verify CV SPRAY PUMP DISCH Valves - CLOSED • SI-880A • SI-880B • SI-880C • SI-880D	

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED

****

CAUTION

Opening SI-866A AND SI-866B, HOT LEG INJs, with only one SI Pump running will cause pump runout.

****

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED
3.	Align For Hot Leg Recirculation As Follows:	
	a. Check SI Pump Status - TWO RUNNING	a. Stop the running SI Pump AND RHR Pump.
	b. Verify SI-866A, LOOP 3 HOT LEG INJ - OPEN	b. Open SI-866B, LOOP 2 HOT LEG INJ.
	c. Verify BIT OUTLET Valves - CLOSED • SI-870A • SI-870B	
	d. Check SI Valve Status • SI-866 - ONE OPEN • SI-870A & B - BOTH CLOSED	d. WHEN the valves have repositioned, THEN Go To Step 3.e.
	e. Check Pump Status • One RHR Pump - RUNNING • Two SI Pumps - RUNNING	e. Start One RHR Pump AND One SI Pump on each available Emergency Bus.
	f. Go To Step 8.	

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED

****

<u>CAUTION</u>

Steps 4 through 7 must be performed without delay to minimize the time without flow through the core.

****

4. Perform The Following:

   a. Verify the RHR PUMPs - ALL STOPPED:

   b. Verify RHR HX DISCH Valves - CLOSED

      - RHR-759A
      - RHR-759B

   c. Verify RHR LOOP RECIRC Valves - OPEN

      - SI-863A
      - SI-863B

****

<u>CAUTION</u>

Opening SI-866A <u>AND</u> SI-866B, HOT LEG INJs, with only one SI Pump running will cause pump runout.

****

5. Verify The Following Valves Aligned For Hot Leg Recirculation:

   a. SI-866A, LOOP 3 HOT LEG INJ - OPEN

      RESPONSE NOT OBTAINED: a. Open SI-866B, LOOP 2 HOT LEG INJ.

   b. BIT OUTLET Valves - CLOSED

      - SI-870A
      - SI-870B

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED

****

CAUTION

Valves RHR-759A and RHR-759B, RHR HX DISCHs, are closed. The RHR Pumps will run dead-headed and are subject to damage until the SI Pumps are started.

****

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED
6.	Establish Hot Leg Recirculation Flow As Follows:	
	a. Check RHR-759A - CLOSED	a. Perform the following: 1) Verify CLOSED RHR-759B. 2) Verify RHR PUMP A is stopped. 3) Open SI-863B, RHR LOOP RECIRC. 4) Start RHR PUMP B. 5) Go To Step 7.
	b. Open SI-863A, RHR LOOP RECIRC.	b. Perform the following: 1) Verify RHR-759B CLOSED. 2) Open SI-863B, RHR LOOP RECIRC. 3) Close SI-863A. 4) Start RHR PUMP B 5) Go To Step 7.
	c. Start RHR PUMP A	c. Perform the following: 1) Verify RHR-759B CLOSED. 2) Open SI-863B, RHR LOOP RECIRC. 3) Start RHR PUMP B

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED
7.	Start One SI Pump On Each Available Emergency Bus	
8.	Check Indicated Flow On The Appropriate Flow Meters:	

PATH	FLOW METERS
SI-866B	FI-940, SI HOT LEG HEADER FLOW FI-933, SI LOOP 2 HOT LEG FLOW
SI-866A	FI-940, SI HOT LEG HEADER FLOW FI-932, SI LOOP 3 HOT LEG FLOW

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED
9.	Determine If Flow Should Be Established To Cold Legs As Follows:	
	a. Check RCS pressure - LESS THAN 125 PSIG	a. Go To Step 11.
	b. Check ALL of the below components - OPERABLE • FI-605, RHR TOTAL FLOW • RHR-759A & B, RHR HEAT EXCHANGER OUTLETs • SI-863A & B, RHR LOOP RECIRCs. • RHR Pumps A & B	b. Go To Step 11.

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED
10.	Align For Cold Leg Injection As Follows:	
	a. Establish communications with operators stationed at the breakers for RHR HEAT EXCHANGER OUTLETs: • RHR-759A (MCC-5, CMPT 14C) • RHR-759B (MCC-6, CMPT 13C)	
	b. Start the second RHR PUMP	b. Go To Step 11.
	c. Verify BOTH RHR LOOP RECIRC Valves - OPEN • SI-863A • SI-863B	
	d. Open RHR-759A, RHR HX A DISCH <u>AND</u> locally open RHR-759A Breaker when RHR flow on FI-605 indicates 1200 gpm	
	e. Open RHR-759B, RHR HX B DISCH <u>AND</u> locally open RHR-759B breaker when RHR flow on FI-605 indicates 2300 gpm	
	f. Go To Step 15	
11.	Check Time Since Hot Leg Flow Established - 16 HOURS	<u>WHEN</u> 16 hours has elapsed, <u>THEN</u> Go To Step 12.

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED
12.	Establish Cold Leg Injection As Follows:	
	a. Check SI Pump Status - TWO RUNNING	a. Stop the running SI Pump AND RHR Pump.
	b. Verify at least one BIT OUTLET Valve - OPEN • SI-870A OR • SI-870B	
	c. Verify SI-869, SI HOT LEG HDR - CLOSED	c. Verify BOTH SI-866A AND SI-866B are CLOSED.
	d. Check SI Valve Status • SI-869 - CLOSED • SI-870A OR B - OPEN	d. WHEN the valves have repositioned, THEN Go To Step 12.e.
	e. Check Pump Status • One RHR Pump - RUNNING • Two SI Pumps - RUNNING	e. Start One RHR Pump AND One SI Pump on each available Emergency Bus.
13.	Check Time Since Cold Leg Flow Established - 16 HOURS	Contact Plant Operations Staff to evaluate long term plant status. When 16 hours has elapsed, THEN Go To Step 14.

STEP	INSTRUCTIONS	RESPONSE NOT OBTAINED
14.	Establish Hot Leg Injection As Follows:	
	a. Check SI Pump Status - TWO RUNNING	a. Stop the running SI Pump <u>AND</u> RHR Pump.
	b. Verify SI-869, SI HOT LEG HDR - OPEN	
	c. Verify one HOT LEG INJ Valve - OPEN • SI-866A <u>OR</u> • SI-866B	
	d. Verify BIT OUTLETs - CLOSED • SI-870A • SI-870B	
	e. Check SI Valve Status • SI-866 - ONE OPEN • SI-870A & B - BOTH CLOSED	e. <u>WHEN</u> the valves have repositioned, <u>THEN</u> Go To Step 14.f.
	f. Check Pump Status • One RHR Pump - RUNNING • Two SI Pumps - RUNNING	f. Start One RHR Pump <u>AND</u> One SI Pump on each available Emergency Bus.
	g. Go To Step 11	
15.	Contact Plant Operations Staff To Evaluate Long Term Plant Status	

- END -

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM COM-B.2.a

Perform Emergency Refill of IVSW Tank Using Service Water (OP-911)

CANDIDATE: ______________________________

EXAMINER: ______________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task: Perform Emergency Refill of IVSW Tank Using Service Water (OP-911)

Alternate Path: NONE

Facility JPM #: IP-036

K/A Rating: 069AA1.03 Importance: SRO 2.8 RO 3.0

K/A Statement: Ability to operate and / or monitor the following as they apply to the Loss of Containment Integrity: Fluid systems penetrating containment

Task Standard: The IVSW Tank has been filled to approximately 75% using SW and the lineup has been restored.

Preferred Evaluation Location: Simulator ______ In Plant X

Preferred Evaluation Method: Perform ______ Simulate X

References: OP-911, Isolation Valve Seal Water System

Validation Time: 20 minutes Time Critical: NO

Candidate: ____________________________

Time Start: ________ Time Finish: ______

Performance Time: ______ minutes

Performance Rating: SAT ______ UNSAT ______

Comments: ____

____

Examiner: ________________________ Date: ______

Signature

Tools/Equipment/Procedures Needed:

OP-911
Locked Valve Key
Pipe Wrench

READ TO OPERATOR

DIRECTION TO CANDIDATE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

DO NOT operate actual plant equipment unless specifically authorized to do so. Follow standard ALARA practices in the RCA.

INITIAL CONDITIONS:

The unit is operating at 70% power.

IVSW Tank level is 68% with NO Primary Makeup Water Pumps available to makeup to the tank.

The prequisites for emergency filling the IVSW tank from the Service Water system have been completed.

Both SW Booster Pumps are secured. SW header pressure is 47 psig.

INITIATING CUES:

You have been directed to fill the IVSW tank to 75% level from the Service Water system in accordance with OP-911, "Isolation Valve Seal Water System."

START TIME: ________

STEP 1: Locates proper procedure and required information. STANDARD: Locates OP-911, Section 8.3, determines Step 8.3.2.2 is to be performed NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 2: IF a Service Water Booster Pump IS NOT operating, THEN perform the following: Close SW-502, SW PUMP SUPPLY TO PENETRATION COOLERS (**Step 8.3.2.2.a**) STANDARD: Rotates handwheel for SW-502 in CW direction until movement stops NOTES: ***CUE: HANDWHEEL HAS BEEN ROTATED IN A CW DIRECTION AND WILL NOT MOVE ANY FURTHER.*** **CRITICAL TO ENSURE ADEQUATE SW PRESSURE TO FILL ISVW TANK.** COMMENTS:	**CRITICAL STEP** ____ SAT ____ UNSAT

<table>
<tr><td>STEP 3:</td><td>Remove the cap at IVSW-9, IVSW TANK SAMPLE (Step 8.3.2.2.b)</td><td rowspan="4">CRITICAL STEP

____ SAT

____ UNSAT</td></tr>
<tr><td>STANDARD:</td><td>Uses pipe wrench to rotate cap in CCW direction until removed from end of pipe</td></tr>
<tr><td>NOTES:</td><td>CUE: CAP HAS ROTATED IN CCW DIRECTION AND HAS COME OFF PIPE.

CRITICAL TO ALLOW VENTING OF TANK TO ALLOW SW TO FILL TANK.</td></tr>
<tr><td>COMMENTS:</td><td></td></tr>
<tr><td>STEP 4:</td><td>NOTE: To ensure the IVSW system operates as designed, if an automatic actuation occurs or if a manual initiation is required while this section is in progress, actions shall be taken to restore normal Nitrogen pressure to the IVSW tank (First Note before Step 8.3.2.2.c)</td><td rowspan="4">____ SAT

____ UNSAT</td></tr>
<tr><td>STANDARD:</td><td>Acknowledges note</td></tr>
<tr><td>NOTES:</td><td></td></tr>
<tr><td>COMMENTS:</td><td></td></tr>
</table>

STEP 5:	NOTE: The following step isolates an essential feature of IVSW AND requires entry into the REQUIRED ACTIONS OF ITS LCO 3.6.8 during Modes 1, 2, 3, and 4 (**Second Note before Step 8.3.2.2.c**)	
STANDARD:	Acknowledges note	
NOTES:		
COMMENTS:		____ SAT ____ UNSAT
STEP 6:	Close the following valves to isolate Nitrogen to the IVSW tank: - IVSW-44A, PRV-1715C OUTLET - IVSW-44B, PRV-1715D OUTLET (**Step 8.3.2.2.c**)	**CRITICAL STEP**
STANDARD:	Rotates handwheels for ISVW-44A & B in CW direction until movement stops	
NOTES:	***CUE: HANDWHEELS HAVE BEEN ROTATED IN A CW DIRECTION AND WILL NOT MOVE ANY FURTHER.*** **CRITICAL TO ENSURE ISVW TANK PRESSURE CAN BE LOWERED.**	
COMMENTS:		____ SAT ____ UNSAT

STEP 7:	IF the plant is in Modes 1, 2, 3, OR 4, THEN notify the CRSS/SSO of Action Statement entry AND record time / date (**Step 8.3.2.2.d**)	
STANDARD:	Determines plant is in Mode 1 and notifies the CRSS of Action Statement entry and records time and date	
NOTES:	***CUE: CRSS ACKNOWLEDGES REPORT.***	____ SAT
COMMENTS:		____ UNSAT
STEP 8:	NOTE: IVSW tank pressure AND level may be read locally at PI-1910 AND LIT-1912, respectively. LG-1913 may also be used for level indication. Due to the height difference between the sensing points for Service Water Header pressure and IVSW Tank pressure, the IVSW Tank pressure may have to be decreased greater than 13 psig below the indicated Service Water header pressure before flow into the tank will occur. The following step for operating IVSW-9 is CONTINUOUS ACTION STEP AND should be used anytime necessary during water addition to control IVSW tank pressure (**Note before Step 8.3.2.2.e**)	
STANDARD:	Acknowledges note	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 9:	Throttle open AND close IVSW-9, IVSW TANK SAMPLE, to vent IVSW tank pressure to less than Service Water Header pressure as necessary to allow makeup (**Step 8.3.2.2.e**)	
STANDARD:	Rotates handwheel for IVSW-9 in the CW direction to throttle open and fully CCW to throttle closed	
NOTES:	***CUE: WHEN VALVE IS BEING THROTTLED OPEN, PROVIDE CUE THAT HANDWHEEL HAS ROTATED IN CCW DIRECTION.*** ***WHEN VALVE IS BEING CLOSED FOLLOWING PRESSURE DROP, PROVIDE CUE THAT HANDWHEEL HAS ROTATED IN CW DIRECTION AND WILL NOT MOVE ANY FURTHER.*** ***NOTE: Critical when performed later to lower tank pressure to allow SW to fill IVSW Tank.***	____ SAT
COMMENTS:		____ UNSAT

STEP 10:	Unlock AND open SW-200, IVSW TANK SUPPLY (**Step 8.3.2.2.f**)	**CRITICAL STEP**
STANDARD:	Unlocks SW-200 locking device and rotates handwheel in CCW until handwheel will not move any further, then rotates slightly back in CW direction	
NOTES:	***CUE: HANDWHEEL HAS BEEN ROTATED IN A CCW DIRECTION, WOULD NOT MOVE ANY FURTHER, AND HAS BEEN ROTATED SLIGHTLY IN CW DIRECTION.*** **CRITICAL TO PROVIDE MAKEUP FLOWPATH.**	____ SAT
COMMENTS:		____ UNSAT
STEP 11:	Throttle open SW-202, IVSW TANK SUPPLY, to fill the IVSW tank to within the normal range of 70 to 90% (**Step 8.3.2.2.g**)	**CRITICAL STEP**
STANDARD:	Rotates handwheel for SW-202 in CCW direction and monitors LIT-1912 and / or LG-1913 for level increase	
NOTES:	***CUE: HANDWHEEL HAS ROTATED IN CCW DIRECTION. NO LEVEL CHANGE IS NOTED.*** **CRITICAL TO PROVIDE MAKEUP FLOWPATH.**	____ SAT
COMMENTS:		____ UNSAT

STEP 12:	Monitor ISVW Tank and SW header pressures (**Actually performance of previous note and step**)	
STANDARD:	Monitors IVSW Tank (PI-1910) and SW header pressures	
NOTES:	***CUE: IVSW TANK PRESSURE INDICATES 47 PSIG AND SW HEADER PRESSURE IS 47 PSIG.***	____ SAT
COMMENTS:		____ UNSAT
STEP 13:	Throttle open AND close IVSW-9, IVSW TANK SAMPLE, to vent IVSW tank pressure to less than Service Water Header pressure as necessary to allow makeup (**Actual performance of Step 8.3.2.2.e**)	**CRITICAL STEP**
STANDARD:	Rotates handwheel for IVSW-9 in the CW direction to throttle open until level starts to rise in tank and fully CCW to throttle closed	
NOTES:	***CUE: WHEN VALVE IS BEING THROTTLED OPEN, PROVIDE CUE THAT HANDWHEEL HAS ROTATED IN CCW DIRECTION.*** ***LEVEL IN TANK IS BEGINNING TO RISE.*** ***WHEN VALVE IS BEING CLOSED FOLLOWING PRESSURE DROP, PROVIDE CUE THAT HANDWHEEL HAS ROTATED IN CW DIRECTION AND WILL NOT MOVE ANY FURTHER.*** **CRITICAL TO LOWER TANK PRESSURE TO ALLOW SW TO FILL TANK.**	____ SAT
COMMENTS:		____ UNSAT

STEP 14:	WHEN desired IVSW tank level is obtained, THEN close SW-202, IVSW TANK SUPPLY (**Step 8.3.2.2.h**)	**CRITICAL STEP ***
STANDARD:	When IVSW Tank level is at or near 75%, rotates handwheel for SW-202 in CW direction until movement stops and verifies level in tank stops rising	
NOTES:	***CUE: HANDWHEEL HAS BEEN ROTATED IN CW DIRECTION AND WILL NOT MOVE ANY FURTHER.*** ***LEVEL IS 76% AND STABLE.*** **CRITICAL TO ISOLATE TANK FROM SW TO PREVENT OVERFILL.** ****NOTE: Either JPM Step 14 OR 15 is critical, but NOT both.***	____ SAT
COMMENTS:		____ UNSAT

STEP 15:	Lock closed SW-200, IVSW TANK SUPPLY (**Step 8.3.2.2.i**)	**CRITICAL STEP ***
STANDARD:	Rotates handwheel for SW-200 in CW direction until movement stops and reinstalls locking device	
NOTES:	***CUE: HANDWHEEL HAS BEEN ROTATED IN CW DIRECTION AND WILL NOT MOVE ANY FURTHER.*** ***LOCKING DEVICE IS INSTALLED.*** **CRITICAL TO ISOLATE SW FROM TANK TO PREVENT OVERFILL.** ****NOTE: Either JPM Step 14 OR 15 is critical, but NOT both.***	____ SAT
COMMENTS:		____ UNSAT
STEP 16:	Verify CLOSED IVSW-9, IVSW TANK SAMPLE (**Step 8.3.2.2.j**)	
STANDARD:	Verifies IVSW-9 is closed by attempting to rotate handwheel in CW direction without movement	
NOTES:	***CUE: HANDWHEEL WILL NOT MOVE IN CW DIRECTION.***	____ SAT
COMMENTS:		____ UNSAT

<table>
<tr><td>STEP 17:</td><td>Open the following valves to restore Nitrogen to the IVSW tank:
- IVSW-44A, PRV-1715C OUTLET
- IVSW-44B, PRV-1715D OUTLET (Step 8.3.3.2.k)</td><td>CRITICAL STEP</td></tr>
<tr><td>STANDARD:</td><td>Rotates handwheels for ISVW-44A & B in CCW direction until movement stops, then rotates back slightly in CW direction</td><td></td></tr>
<tr><td>NOTES:</td><td>CUE: HANDWHEELS HAVE BEEN ROTATED IN A CCW DIRECTION, WOULD NOT MOVE ANY FURTHER, AND HAVE BEEN ROTATED SLIGHTLY IN CW DIRECTION.

CRITICAL TO RESTORE ISVW TANK TO OPERABLE CONDITION.</td><td>_____ SAT</td></tr>
<tr><td>COMMENTS:</td><td></td><td>_____ UNSAT</td></tr>
<tr><td>STEP 18:</td><td>IF an Action Statement entry is in effect for the IVSW Tank AND no other conditions exist which requires the IVSW Tank to be inoperable, THEN notify the CRSS/SSO of exiting the Action Statement AND record time / date (Step 8.3.2.2.l)</td><td></td></tr>
<tr><td>STANDARD:</td><td>Notifies CRSS that tank has been restored to operable status and records time / date</td><td></td></tr>
<tr><td>NOTES:</td><td>CUE: CRSS ACKNOWLEDGES REPORT.</td><td>_____ SAT</td></tr>
<tr><td>COMMENTS:</td><td></td><td>_____ UNSAT</td></tr>
</table>

STEP 19:	Install the cap at IVSW-9 (**Step 8.3.2.2.m**)	
STANDARD:	Places cap on end of pipe and uses pipe wrench to rotate in CW direction until movement stops	
NOTES:	***CUE: CAP HAS BEEN PLACED ON END OF CAP AND ROTATED IN CW DIRECTION UNTIL IT CAN NOT BE MOVED ANY FURTHER.***	____ SAT
COMMENTS:		____ UNSAT
STEP 20:	Verify open SW-502, SW PUMP SUPPLY TO PENETRATION COOLERS (**Step 8.3.2.2.n**)	**CRITICAL STEP**
STANDARD:	Rotates handwheel for SW-502 in CCW direction until movement stops and then rotates slightly in CW direction	
NOTES:	***CUE: HANDWHEEL HAS BEEN ROTATED IN A CCW DIRECTION, WOULD NOT MOVE ANY FURTHER, AND HAS BEEN ROTATED SLIGHTLY IN A CW DIRECTION.*** **CRITICAL TO ENSURE SW AVAILABLE TO CONTAINMENT VENT UNITS.**	____ SAT
COMMENTS:		____ UNSAT
	END OF TASK	

STOP TIME: ________

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

The unit is operating at 70% power.

IVSW Tank level is 68% with NO Primary Makeup Water Pumps available to makeup to the tank.

The prequisites for emergency filling the IVSW tank from the Service Water system have been completed.

Both SW Booster Pumps are secured. SW header pressure is 47 psig.

INITIATING CUES:

You have been directed to fill the IVSW tank to 75% level from the Service Water system in accordance with OP-911, "Isolation Valve Seal Water System."

DO NOT operate actual plant equipment unless specifically authorized to do so. Follow standard ALARA practices in the RCA.

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CAROLINA POWER & LIGHT COMPANY
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 3
PART 2

OPERATING PROCEDURE

OP-911

ISOLATION VALVE SEAL WATER SYSTEM

REVISION 18

SUMMARY OF CHANGES
DCF 2000P0392

SECTION / STEP	REVISION COMMENTS
4.1	Revised IVSW Tank pressure to less than 47 psig as indicated on local indication PI-1910 (actual ITS limit less than 44.6 psig) based on ESR 97-00326, Rev 1.
5.1.1.4	Revised IVSW Tank level from 48.2% to 49% to provide a readable value which is the same as the value checked in OST-023, and pressure from 44 psig to 47 psig based on ESR 97-00326, Rev 1, account for gage uncertainties on PI-1910, and to provide a readable value.
6.1.1.4	Deleted step. IVSW Tank pressure has no bearing on the need for N2 bottle change out.
6.2.2.3, NOTE prior to 6.3.2.1, NOTE prior to 8.1.2.12	Revised normal operating range for IVSW Tank pressure to 53-55 psig based on ESR 97-00326, Rev 1.
8.3.2	Revised entire subsection to sectionalize actions for when a Service Water Booster Pump **IS** operating versus when a Service Water Booster Pump **IS NOT** operating. Removed the conditional for 51 psig to determine which steps to use to fill the IVSW Tank with Service Water. The Service Water pressure is sensed on the first level Aux. Building and taking into account for the static head to the second level, Service Water header pressure would have to be above approximately 63 psig to provide the necessary driving force to overcome the new IVSW Tank pressure operating range of 53 - 55 psig.

TABLE OF CONTENTS

1.0 **PURPOSE**

1.1 This procedure provides instructions for the normal operation, shutdown, and infrequent operation of the Isolation Valve Seal Water System. It also provides a checklist for placing the system in stand-by operation for automatic initiation by a Containment Phase "A" Isolation signal.

2.0 **REFERENCES**

2.1 Improved Technical Specification, LCO 3.6.8

2.2 UFSAR, Section 6.8, Isolation Valve Seal Water System

2.3 OP-001, Reactor Control and Protection System

2.4 OP-601, DC Supply System

2.5 OP-603, Electrical Distribution

2.6 OP-903, Service Water System

2.7 OP-905, Instrument and Station Air System

2.8 OP-907, Compressed Gas System

2.9 OP-915-1, Demineralized and Primary Water

2.10 PLP-037, Conduct of Infrequently Performed Tests or Evolutions

2.11 PATH-1, EOP Network

2.12 OST-933, Containment Isolation Valves Leakage Test

2.13 G-190262, Isolation Valve Seal Water Flow Diagram

2.14 Curve 8.26, Isolation Valve Seal Water Tank Curve

2.15 ESR-97-00326, IVSW Tank Low Pressure Alarm

3.0 PREREQUISITES

3.1 Electrical Distribution is in service IAW OP-603 as necessary to provide power to instrumentation AND IAW OP-601 as necessary to provide power to solenoid valves EV-1922A AND EV-1922B.

3.2 The Instrument and Station Air System is in service IAW OP-905 as necessary to supply air to PCV-1922A AND PCV-1922B.

3.3 The Nitrogen supply is in service IAW OP-907 as necessary to provide primary source of Nitrogen for the IVSW tank.

3.4 The Reactor Control and Protection System is in service IAW OP-001 as necessary to provide the automatic initiation signal.

3.5 The backup Nitrogen supply from the two locally mounted tanks is available AND each tank is pressurized to greater than 1000 psig.

3.6 The Demineralized and Primary Water System is in service IAW OP-915-1 as necessary to provide a supply of make-up water to the IVSW tank.

3.7 The Service Water System is in service IAW OP-903 as necessary to provide a back-up supply of water to the IVSW tank.

4.0 PRECAUTIONS AND LIMITATIONS

4.1 In MODES 1, 2, 3, and 4, IVSW tank pressure less than 47 psig as indicated on local indication PI-1910 (actual ITS limit less than 44.6 psig) OR IVSW tank level less than 85 gallons (48.2%) requires entry into ITS LCO 3.6.8 REQUIRED ACTIONS. (ITS SR 3.6.8.1 and SR 3.6.8.2)

4.2 IVSW tank pressure shall be monitored during make-up to the tank to prevent lifting of system relief valves set at 68 to 72 psig.

4.3 When IVSW has been initiated, serviced systems shall not be returned to operation until IVSW is terminated OR isolated.

4.4 Whenever IVSW is isolated to one or more containment penetrations, the IVSW system shall be deemed inoperable and the required actions of ITS LCO 3.6.8 shall be entered.

4.5 The principles of ALARA shall be used in planning and performing work and operations in the Radiation Control Area.

4.6 This procedure has been screened IAW PLP-037 criteria and determined to be N/A to PLP-037.

INIT

8.3 Emergency Refill of the Isolation Valve Seal Water Tank Using Service Water Makeup

8.3.1 Initial Conditions

1. This revision has been verified to be the latest revision available.

Name (Print)	Initial	Signature	Date

2. The Isolation Valve Seal Water System is aligned IA W Attachment 9.1. ____

3. No Primary Water source is available for makeup to IVSW. ____

4. The IVSW tank level is less than or equal to 70% <u>OR</u> is decreasing. ____

5. The Service Water System is aligned for service IAW OP-903 as necessary to provide a back-up water supply to the IVSW tank. ____

8.3.2 Instructions INIT VERI

1. IF a Service Water Booster Pump **IS** operating, THEN perform the following:

   a. Remove the cap at IVSW-9, IVSW TANK SAMPLE. ____

> **NOTE:** IVSW tank pressure AND level may be read locally at PI-1910 AND LIT-1912, respectively. LG-1913 may also be used for level indication.
>
> The following step for operating IVSW-9 is CONTINUOUS ACTION STEP AND should be used anytime necessary during water addition to control IVSW tank pressure.

   b. Throttle open AND close IVSW-9, IVSW TANK SAMPLE, as necessary during filling to maintain IVSW tank pressure within normal operating limits of 53 to 55 psig. ____

   c. Unlock AND open SW-200, IVSW TANK SUPPLY. ____

   d. Throttle open SW-202, IVSW TANK SUPPLY, to fill the IVSW tank to within the normal range of 70 to 90%. ____

   e. WHEN desired IVSW tank level is obtained, THEN close SW-202, IVSW TANK SUPPLY. ____

   f. Lock closed SW-200, IVSW TANK SUPPLY. ____

   g. Verify CLOSED IVSW-9, IVSW TANK SAMPLE. ____ ____

   h. Install the cap at IVSW-9. ____

INIT VERI

2. IF a Service Water Booster Pump **IS NOT** operating, THEN perform the following:

   a. Close SW-502, SW PUMP SUPPLY TO PENETRATION COOLERS. ____

   b. Remove the cap at IVSW-9, IVSW TANK SAMPLE. ____

> **NOTE:** To ensure the IVSW system operates as designed, if an automatic actuation occurs or if a manual initiation is required while this section is in progress, actions shall be taken to restore normal Nitrogen pressure to the IVSW tank.
>
> **NOTE:** The following step isolates an essential feature of IVSW AND requires entry into the REQUIRED ACTIONS OF ITS LCO 3.6.8 during Modes 1, 2, 3, and 4.

   c. Close the following valves to isolate Nitrogen to the IVSW tank:

      - IVSW-44A, PRV-1715C OUTLET ____ ____
      - IVSW-44B, PRV-1715D OUTLET ____ ____

   d. IF the plant is in Modes 1, 2, 3, OR 4, THEN notify the CRSS/SSO of Action Statement entry AND record time / date.

      ________/________ ____
      Time Date

8.3.2.2 (Continued) INIT VERI

> **NOTE:** IVSW tank pressure AND level may be read locally at PI-1910 AND LIT-1912, respectively. LG-1913 may also be used for level indication.
>
> Due to the height difference between the sensing points for Service Water Header pressure and IVSW Tank pressure, the IVSW Tank pressure may have to be decreased greater than 13 psig below the indicated Service Water header pressure before flow into the tank will occur.
>
> The following step for operating IVSW-9 is CONTINUOUS ACTION STEP AND should be used anytime necessary during water addition to control IVSW tank pressure.

e. Throttle open AND close IVSW-9, IVSW TANK SAMPLE, to vent IVSW tank pressure to less than Service Water Header pressure as necessary to allow makeup. ____

f. Unlock AND open SW-200, IVSW TANK SUPPLY. ____

g. Throttle open SW-202, IVSW TANK SUPPLY, to fill the IVSW tank to within the normal range of 70 to 90%. ____

h. WHEN desired IVSW tank level is obtained, THEN close SW-202, IVSW TANK SUPPLY. ____

i. Lock closed SW-200, IVSW TANK SUPPLY. ____

j. Verify CLOSED IVSW-9, IVSW TANK SAMPLE. ____ ____

k. Open the following valves to restore Nitrogen to the IVSW tank:

- IVSW-44A, PRV-1715C OUTLET ____ ____
- IVSW-44B, PRV-1715D OUTLET ____ ____

8.3.2.2 (Continued) INIT

l. IF an Action Statement entry is in effect for the IVSW Tank AND no other conditions exist which requires the IVSW Tank to be inoperable, THEN notify the CRSS/SSO of exiting the Action Statement AND record time / date.

_______ / _______ _____
Time Date

m. Install the cap at IVSW-9. _____

n. Verify open SW-502, SW PUMP SUPPLY TO PENETRATION COOLERS. _____

	Initials	Name (Print)	Date
Performed By:	_____	_____	_____
	_____	_____	_____
	_____	_____	_____

Approved By: ______________________ _____
Superintendent Shift Operations Date

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM COM-B.2.b

Lineup the Deepwell Pumps as Backup to AFW System (OP-402)

CANDIDATE: ______________________________

EXAMINER: ______________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task: Lineup the Deepwell Pumps as Backup to AFW System (OP-402)

Alternate Path: NONE

Facility JPM #: IP-055

K/A Rating: 061A1.04 Importance: SRO 3.9 RO 3.9

K/A Statement: Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the AFW controls including: AFW source tank level

Task Standard: Deepwell Pumps are aligned as a backup to the AFW system.

Preferred Evaluation Location: Simulator ______ In Plant X

Preferred Evaluation Method: Perform ______ Simulate X

References: OP-402, Auxiliary Feedwater System

Validation Time: 15 minutes Time Critical: NO

Candidate: ____________________

Time Start: ______ Time Finish: ______

Performance Time: ______ minutes

Performance Rating: SAT ______ UNSAT ______

Comments: ____________________

____

Examiner: ____________________ Date: ______
Signature

Tools/Equipment/Procedures Needed:

OP-402
Locked Valve Key
Pipe Wrench

READ TO OPERATOR

DIRECTION TO CANDIDATE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

DO NOT operate actual plant equipment unless specifically authorized to do so. Follow standard ALARA practices in the RCA.

INITIAL CONDITIONS:

The plant is in hot shutdown due to ruptured Condensate Storage Tank. Condensate Storage Tank level is 9% and decreasing.

All (3) AFW pumps have been stopped. Two (2) Deepwell Pumps are operating.

Section 8.4.2 of OP-402, "Auxiliary Feedwater System," is to be performed.

Prerequisities for Section 8.4.2 have been completed.

INITIATING CUES:

You are to perform the necessary actions in the Turbine Building to align the Deepwater Well Pumps to the suction of the SDAFW Pump in accordance with OP-402. SG 'A' is to be used as the steam source to the SDAFW Pump.

START TIME: ________

STEP 1: Locates proper procedure and required materials STANDARD: Locates OP-402, Section 8.4.2. Locked Valve Key, and Pipe Wrench NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 2: CAUTION: A minimum of TWO Deepwell Pumps shall be in operation to provide enough flow to use the Steam Driven AFW Pump. (**Caution before Step 8.4.2.2.a**) STANDARD: Acknowledges caution and determines 2 Deepwell Pumps operating NOTES: ***NOTE: Initial conditions indicated 2 Deepwell Pumps running.*** COMMENTS:	____ SAT ____ UNSAT

STEP 3:	Instructions For Aligning Service Water VERIFY the AFW Pumps are STOPPED. - SDAFW - MDAFW Pump "A" - MDAFW Pump "B" (**Step 8.4.2.2.a**)	
STANDARD:	Determines all AFW Pumps are stopped	
NOTES:	***NOTE: Initial conditions indicated all AFW Pumps stopped.***	____ SAT
COMMENTS:		____ UNSAT
STEP 4:	NOTE: Closing AFW-1, AFW PUMPS SUCTION FROM CST OR AFW-104, AFW PUMPS SUCTION FROM CST in the next step renders the AFW pumps inoperable (ITS LCO 3.7.4 and ITS SR 3.7.4.1) (**Note before Step 8.4.2.2.b**)	
STANDARD:	Acknowledges note	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 5:	NOTIFY the CRSS/SSO that an Action Statement will be entered AND RECORD the time (**Step 8.4.2.2.b**)	
STANDARD:	CRSS notified and time recorded	
NOTES:	***CUE: CRSS ACKNOWLEDGES REPORT.***	
COMMENTS:		____ SAT ____ UNSAT
STEP 6:	PERFORM the following valve lineup: UNLOCK AND CLOSE AFW-1, AFW PUMPS SUCTION FROM CST (**Step 8.4.2.2.c.1**)	**CRITICAL STEP ***
STANDARD:	Unlocks locking device and rotates handwheel for AFW-1 in CW direction until movement stops	
NOTES:	***CUE: LOCKING DEVICE HAS BEEN REMOVED AND HANDWHEEL HAS BEEN ROTATED IN CW DIRECTION UNTIL THERE IS NO FURTHER MOVEMENT.*** **CRITICAL TO ISOLATE CST FROM DEEPWELL.** **** NOTE: Either JPM Step 6 OR 7 is critical, but NOT both. AFW-1 and AFW-104 share a common chain for locking.***	
COMMENTS:		____ SAT ____ UNSAT

STEP 7:	UNLOCK AND CLOSE AFW-104, AFW PUMPS SUCTION FROM CST (**Step 8.4.2.2.c.2**)	**CRITICAL STEP ***
STANDARD:	Unlocks locking device and rotates handwheel for AFW-104 in CW direction until movement stops	
NOTES:	***CUE: LOCKING DEVICE HAS BEEN REMOVED AND HANDWHEEL HAS BEEN ROTATED IN CW DIRECTION UNTIL THERE IS NO FURTHER MOVEMENT.*** **CRITICAL TO ISOLATE CST FROM DEEPWELL.** **** NOTE: Either JPM Step 6 OR 7 is critical, but NOT both. AFW-1 and AFW-104 share a common chain for locking.***	____ SAT
COMMENTS:		____ UNSAT
STEP 8:	CLOSE DW-20, AFW SUCTION FROM DEEPWELL BACKUP TELL-TALE DRAIN. (**Step 8.4.2.2.c.3**)	**CRITICAL STEP**
STANDARD:	Rotates handwheel for DW-20 in CW direction until movement stops	
NOTES:	***CUE: HANDWHEEL HAS BEEN ROTATED IN CW DIRECTION UNTIL THERE IS NO FURTHER MOVEMENT.*** **CRITICAL TO PROVIDE MAXIMUM DEEPWELL FLOW AVAILABLE TO AFW.**	____ SAT
COMMENTS:		____ UNSAT

STEP 9:	UNLOCK AND OPEN DW-19, DEEPWELL EMERGENCY BACKUP TO AFW SUCTION. (**Step 8.4.2.2.c.4**)	**CRITICAL STEP**
STANDARD:	Unlocks locking device and rotates handwheel for DW-19 in CCW direction until movement stops and then rotates slightly in CW direction	
NOTES:	***CUE: LOCKING DEVICE HAS BEEN REMOVED, HANDWHEEL HAS BEEN ROTATED IN CCW DIRECTION UNTIL THERE IS NO FURTHER MOVEMENT, AND HAS BEEN ROTATED SLIGHTLY CW.*** **CRITICAL TO PROVIDE DEEPWELL WATER TO AFW.**	____ SAT
COMMENTS:		____ UNSAT
STEP 10:	UNLOCK AND OPEN DW-21, AFW SUCTION FROM DEEPWELL EMERGENCY BACKUP. (**Step 8.4.2.2.c.5**)	**CRITICAL STEP**
STANDARD:	Unlocks locking device and rotates handwheel for DW-21 in CCW direction until movement stops and then rotates slightly in CW direction	
NOTES:	***CUE: LOCKING DEVICE HAS BEEN REMOVED, HANDWHEEL HAS BEEN ROTATED IN CCW DIRECTION UNTIL THERE IS NO FURTHER MOVEMENT, AND HAS BEEN ROTATED SLIGHTLY CW.*** **CRITICAL TO PROVIDE DEEPWELL WATER TO AFW.**	____ SAT
COMMENTS:		____ UNSAT

STEP 11:	CLOSE DW-22, WELL WATER HOSE CONNECTION TREE INLET (**Step 8.4.2.2.c.6**)	
STANDARD:	Rotates handwheel for DW-22 in CW direction until movement stops	
NOTES:	***CUE: HANDWHEEL HAS BEEN ROTATED IN CW DIRECTION UNTIL THERE IS NO FURTHER MOVEMENT.***	____ SAT
COMMENTS:		____ UNSAT
STEP 12:	CLOSE DW-27, WELL WATER HOSE CONNECTION TREE BYPASS (**Step 8.4.2.2.c.7**)	
STANDARD:	Rotates handwheel for DW-27 in CW direction until movement stops	
NOTES:	***CUE: HANDWHEEL HAS BEEN ROTATED IN CW DIRECTION UNTIL THERE IS NO FURTHER MOVEMENT.***	____ SAT
COMMENTS:		____ UNSAT

STEP 13:	CAUTION: When Deepwell Water is being supplied to the AFW Pumps, the MDAFW Pumps will have no cooling water to the oil coolers or sealing water to the seals. Under this condition lube oil temperature from the cooler to the bearing should not exceed 140 $^{\circ}$F (**Caution before Step 8.4.2.2.d**)	
STANDARD:	Acknowledges caution	
NOTES:		____ SAT
COMMENTS:		____ UNSAT
STEP 14:	NOTE: Below are the MAXIMUM flow rates to prevent pump runout AND possible damage to the deepwell pumps. (Limits listed in procedure for number of running deepwell pumps versus AFW pump combinations) (**Note before Step 8.4.2.2.d**)	
STANDARD:	Reviews note and acknowledges flow limitation, based on 2 Deepwell Pumps and SDAFW only running, is 145 gpm	
NOTES:		____ SAT
COMMENTS:		____ UNSAT

STEP 15:	Based on the above limitations, START AFW Pumps as follows: IF SDAFW Pump is to be used, THEN PERFORM the following: REMOVE cap AND OPEN AFW-7, SDAFW PUMP SUCTION VENT **(Step 8.4.2.2.d.1.a**)	
STANDARD:	Uses pipe wrench to rotate cap in CCW direction until cap is removed from end of pipe, rotates handwheel for AFW-7 in CCW direction until movement stops, then rotates slightly in CW direction	
NOTES:	***CUE: CAP HAS BEEN REMOVED, HANDWHEEL HAS BEEN ROTATED IN CCW DIRECTION UNTIL THERE IS NO FURTHER MOVEMENT, THEN ROTATED SLIGHTLY IN CW DIRECTION.***	____ SAT
COMMENTS:		____ UNSAT

STEP 16:	WHEN a solid stream of water issues, THEN CLOSE AFW-7 AND INSTALL the cap **(Step 8.4.2.2.d.1.b)**	
STANDARD:	Observes solid stream of water from AFW-7, rotates handwheel in CW direction until movement stops, then uses pipe wrench to rotate cap on to end of pipe until movement stops	
NOTES:	***CUE: SOLID STREAM OF WATER HAS BEEN OBSERVED, HANDWHEEL HAS BEEN ROTATED IN CW DIRECTION UNTIL THERE IS NO FURTHER MOVEMENT, AND CAP HAS BEEN INSTALLED ON PIPE.***	____ SAT
COMMENTS:		____ UNSAT
	END OF TASK	

STOP TIME: ________

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

The plant is in hot shutdown due to ruptured Condensate Storage Tank. Condensate Storage Tank level is 9% and decreasing.

All (3) AFW pumps have been stopped. Two (2) Deepwell Pumps are operating.

Section 8.4.2 of OP-402, "Auxiliary Feedwater System," is to be performed.

Prerequisities for Section 8.4.2 have been completed.

INITIATING CUES:

You are to perform the necessary actions in the Turbine Building to align the Deepwater Well Pumps to the suction of the SDAFW Pump in accordance with OP-402. SG 'A' is to be used as the steam source to the SDAFW Pump.

DO NOT operate actual plant equipment unless specifically authorized to do so. Follow standard ALARA practices in the RCA.

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CAROLINA POWER & LIGHT COMPANY
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 3
PART 2

OPERATING PROCEDURE

OP-402

AUXILIARY FEEDWATER SYSTEM

REVISION 52

SUMMARY OF CHANGES
DCF 2000P0302

STEP #	REVISION COMMENTS
	Revised procedure to the AP-007 format. Added Independent Verification throughout the procedure for the V2-16's, V2-14's and V1-8's IAW PLP-030.
OLD 2.3	Deleted reference to SD-027 since the SD's are no longer part of the POM
2.17	Added the title of the ACR
5.6	Added to provide information about the operability association with HVH-7A & B per OPCF request.
5.8	Added to the P&L's and removed from various NOTES within the procedure. This is basis information and was moved to the P&L's to reduce the "run on" nature of the NOTE.
5.13	Reduced the step to a paragraph structure to reduce space.
Sections 8.2.1, 8.2.2	Combined the steps for placing the FIC controller in manual and lowering the demand signal to reduce number of steps.
Section 8.2.1	Added steps at the end of the section to restore SGBD WLU per OPCF request.
NOTE 8.4.1 & 8.4.2	Added guidance in the NOTE that Independent Verification can be delayed until the end of the procedure due to the timeliness associated with the potential emergency nature of these sections.
Section 8.4.1 & 8.4.2	Combined steps for operation of vent valves to reduce the number of steps. Also rearranged the order of venting to "vent" the pump immediately after it is started. The original revisions could potentially operate all three pumps for a period of time prior to venting the pump casing. Also added a step at the of these sections to verify Independent Verification is complete.
8.4.1.2.d, 8.4.1.3.c	Added a substep to OPEN and subsequently CLOSE SW-251 for additional flow through the cooler. This is part of Ultimate Heat Sink ESR 98-362 which raises the allowable Service Water inlet temperature limits to the plant.
NOTE 8.4.1.2d.2	Relocated the information concerning vent fan operation to this NOTE to reduce number of NOTES in this section.
8.4.1.2.d.3	Relocated this step to perform the check immediately after the pumps are secured.
OLD 8.4.1.3 & 8.4.2.3	Deleted the guidance for restarting AFW pumps when the "normal" lineup is restored. This was unnecessary since normal guidance is provided in other sections of this procedure.
8.4.2.2c	Deleted operations of AFW-24, SW-118 & AFW-24A. These valves would already be in the listed configuration. Therefore, checking the position of these valves is not needed.
Section 8.4.3 & 8.4.4	Deleted the comments section and any guidance to record comments. This was not needed in this procedure.
NOTES 8.4.3.2.d & 8.4.3.e	Revised NOTES to relocate information concerning operation of the vent fans just prior to starting each pump.

TABLE OF CONTENTS

1.0 **PURPOSE**

1.1 To provide a valve checklist and instructions for the Normal and Infrequent Operation of the Auxiliary Feedwater System.

2.0 **REFERENCES**

2.1 ITS LCO 3.7.4 and 3.7.5 and ITS SR 3.7.4.1

2.2 Updated FSAR, Section 10.4.8

2.3 GP-002, Cold Shutdown to Hot Subcritical at No Load Tavg

2.4 GP-007, Plant Cooldown From Hot Shutdown to Cold Shutdown

2.5 OP-001, Reactor Control and Protection System

2.6 OP-601, DC Supply System

2.7 OP-603, Electrical Distribution

2.8 OP-903, Service Water System

2.9 G-190197, Feedwater, Condensate, and Air Evacuation System Flow Diagram

2.10 Memo RNPD/89-3380 (Condensate Storage Tank Level Requirements)

2.11 HBR8S19-P-101, Station Blackout Coping Analysis Report (and NRC Letter)

2.12 HBR MDAFW Tech Manual (Pacific Pumps) 728-653-06

2.13 Memo RNPD/89-3696 (Auxiliary Feedwater Pump Motors)

2.14 ACR 89-070

2.15 AOP-022, Loss of Service Water

2.16 ACR 92-325, Pump Starting Limitations

2.17 ACR 92-234, SDAFW Pump Tripped during performance of SP-1144

2.18 PLP-037, Conduct of Infrequently Performed Tests or Evolutions

2.19 ACR 94-01050, Required TECH SPECS LCO Action Statement Entry

2.20 ESR 9400974, Evaluation of the Impact on the SDAFW Pump of Permanent Alignment to the Self Cooling Mode

2.21 CR 96-01991, When Feeding the SG with the MDAFW System

2.22 CR 98-01791, Running Pumps With Common Recirc. Flowpath Simultaneously

2.23 ESR 95-00632, Removed Masoneilan Controller

3.0 RESPONSIBILITIES

N/A

4.0 PREREQUISITES

4.1 Plant Electrical Distribution is in service IAW OP-603.

4.2 Service Water System is in operation IAW OP-903, to provide Seal Water and oil cooling for the MDAFW Pumps.

4.3 The Reactor Control and Protection System is in operation IAW OP -001, to provide automatic start signals for the Auxiliary Feedwater Pumps if required by plant condition.

5.0 PRECAUTIONS AND LIMITATIONS

5.1 Operation of Auxiliary Feed Pumps for Steam Generator feed should be minimized. Use Main Feedwater System when possible.

5.2 Under all normal Plant conditions, the Auxiliary Feedwater Pump controllers FIC-1424, FIC-1425, and FIC-6416 will be in the Automatic mode except when being used in the Manual mode to fill the Steam Generators.

5.3 **IF** the RCS is at a temperature less than or equal to 350 °F, **THEN** the Motor Driven Auxiliary Feedwater Pump controllers FIC-1424 **AND** FIC-1425 shall be in the Automatic mode **AND** set to a flowrate of 100 gpm to ensure reliable flow control as system pressure varies.

5.4 When RCS temperature is greater than 350 °F, flow controllers FIC-1424 **AND** FIC-1425 shall be readjusted to a setpoint of 325 gpm in the Automatic mode.

5.5 Starting an AFW pump to fill S/Gs when the S/Gs are in Wet Layup on Recirculation could result in overpressurization of the S/G Wet Layup System.

5.6 **IF** HVH-7A is inoperable, **THEN** MDAFW B will be inoperable. **IF** HVH-7B is inoperable, **THEN** MDAFW A will be inoperable.

5.7 Backup water supply valves from both the Service **AND** Deepwell Water are to be normally closed with the telltale valve between each of the two block valves open to insure that no untreated water enters the plant cycle during normal operation. **IF** backup water is required, **THEN** Service Water is the primary backup and Deepwell water a secondary backup.

5.8 When using the deepwell pumps as a backup supply to the AFW Pumps, maximum **TOTAL** allowable feed rates for various combinations of AFW Pumps vs. deepwell pumps in operation have been established. The flow rates are based on 200 gpm per deepwell pump **AND** assumes 90 gpm seal leakoff flow, 165 gpm recirc flow for the SDAFW Pump, **AND** 60 gpm recirc flow for each MDAFW Pump. These flow rates are to prevent runout **AND** possible damage to the deepwell pumps.

5.9 **IF** the CST level decreases to 10% during AFW operation, **THEN** a backup water supply should be placed in service. Service Water should be used as first backup supply to AFW Pumps. **IF** Service Water is not available, **THEN** Deepwell Water should be used as backup to AFW Pumps.

5.10 The proper sequence to follow when securing a MDAFW Pump is, first, stop the pump, allow it to stop rotating, then close the motor operated discharge valves (V2-16A, V2-16B, V2-16C). This sequence will allow proper seating of the check valves **AND** allow the discharge valves to fully seat which prevents back leakage through all these valves.

5.11 A possible consequence of check valve or discharge valve backleakage is steam binding of the AFW Pumps. Steam binding of the MDAFW Pumps may be indicated by warm discharge piping between the discharge check valve(s) **AND** the V2-16(s). Steam binding of the SDAFW Pump may be indicated by a warm pump casing. **IF** steam binding of any of the AFW Pumps is suspected, **THEN** refer to the Infrequent Operation section of this procedure.

5.12 The Condensate Storage Tank should be maintained full to provide a maximum available water supply.

5.13 **IF** the CST level is decreasing , **THEN** prior to reaching 34%, the reliability of the MDAFW Pumps **AND** power supplies shall be evaluated. Starting the SDAFW Pump to ensure its availability should be considered. The SDAFW Pump should be used to feed the S/Gs but can be operated on recirculation.

5.14 **IF** the CST level is less than 34% **AND** the SDAFW Pump is not running, **THEN** the suction line could drain **AND** potentially air bind the SDAFW Pump. The SDAFW Pump should be considered inoperable until all of the following conditions exist: (ITS LCO 3.7.4)

1. CST level greater than 34% **OR** alternate water source in service to suction.
2. Suction line vented through AFW-7.
3. Discharge line vented through AFW-18.

5.15 The Turbine Driven Pump Discharge Pressure Controller should be set at its highest point so that the Turbine will operate at the maximum set speed during emergency conditions. The flow controller FIC-6416 will be in the Automatic mode **AND** set to 500 gpm.

5.16 Isolation of AFW to a S/G with an AFW automatic start signal present will require holding the control switch in the CLOSED position until the motor operator breaker is opened.

5.17 **IF** the SDAFW Pump discharge piping has been drained **OR** is suspected of **NOT** being water solid, vent the SDAFW Pump IAW Section 8.4.5.

5.18 When the MDAFW Pumps are operated in manual, the maximum flow rate is 100 gpm when RCS temperature is less than or equal to 350°F **AND** 325 gpm when RCS temperature is greater than 350°F. This will ensure consistency with the values used for operating the MDAFW pumps in automatic **AND** will ensure the S/Gs will not be overpressurized.

5.19 When the SDAFW pump is operated in manual, the maximum flow is 500 gpm. This will ensure consistency with the value used for operating the pump in automatic.

5.20 The principles of **ALARA** shall be used in planning and performing work and operations in the Radiation Control Area.

5.21 Both MDAFW Pumps should not be run on recirculation simultaneously when forward flow to the S/Gs is not established with the exception of swapping running pumps. (CR 98-01791)

5.22 Operation of any MDAFW Pump will result in non-conservative output from the continuous calorimetric program when flowing water to the S/Gs.

5.23 A pump start is any time the motor windings are energized as a result of breaker operation. The MDAFW Pump starting limitations are as follows (The flowchart below should aid in determining if the pump should be started): (ACR 92-325)

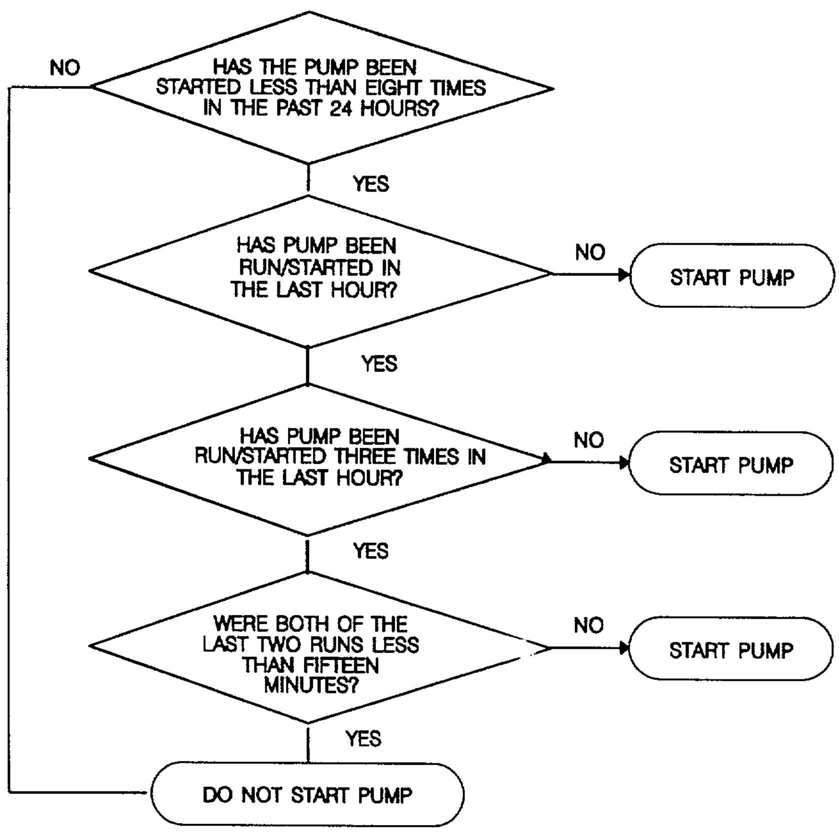
5.23.1 **IF** the pump has not been run in the last hour, **THEN** three (3) consecutive starts are allowed.

5.23.2 **IF** the pump has been started three (3) times in the last hour **AND** neither of the last two (2) starts was a run of at least 15 minutes, **THEN** no further starts are allowed for one hour.

1. Any run in the previous hour is considered one of the three (3) allowed starts.

5.23.3 **IF** the pump was run at least 15 minutes **AND** stopped, **THEN** two (2) consecutive starts are allowed with no waiting period.

5.23.4 Maximum of eight starts per day **AND** run time is 15 minutes or more between starts.



INIT

8.4.2 Using Deepwell Pumps As Backup Supply to Auxiliary Feedwater Pumps

1. Initial Conditions

> **NOTE:** This section has been screened IAW PLP-037 criteria and determined to be a Case Three activity. No additional management involvement is required beyond that routinely provided by first line supervision.
>
> This section of OP-402 may be used during emergency conditions. Therefore, independent verification may be deferred until operations requiring the Deepwell backup supply are completed.

a. This revision has been verified to be the latest revision available.

Name (Print)	Initial	Signature	Date

2. Instruction For Aligning Deepwell Pumps

> **CAUTION**
>
> A minimum of **TWO** Deepwell Pumps shall be in operation to provide enough flow to use the Steam Driven AFW Pump.

a. VERIFY the AFW Pumps are STOPPED.

- SDAFW _____
- MDAFW Pump "A" _____
- MDAFW Pump "B" _____

> **NOTE:** Closing AFW-1, AFW PUMPS SUCTION FROM CST **OR** AFW-104, AFW PUMPS SUCTION FROM CST in the next step renders the AFW pumps inoperable (ITS LCO 3.7.4 and ITS SR 3.7.4.1)

b. NOTIFY the CRSS/SSO that an Action Statement will be entered **AND** RECORD the time. Time _____ _____

8.4.2.2 (Continued) INIT

c. PERFORM the following valve lineup:

1) UNLOCK **AND** CLOSE AFW-1, AFW PUMPS SUCTION FROM CST. ____

2) UNLOCK **AND** CLOSE AFW-104, AFW PUMPS SUCTION FROM CST. ____

3) CLOSE DW-20, AFW SUCTION FROM DEEPWELL BACKUP TELL-TALE DRAIN. ____

4) UNLOCK **AND** OPEN DW-19, DEEPWELL EMERGENCY BACKUP TO AFW SUCTION. ____

5) UNLOCK **AND** OPEN DW-21, AFW SUCTION FROM DEEPWELL EMERGENCY BACKUP. ____

6) CLOSE DW-22, WELL WATER HOSE CONNECTION TREE INLET. ____

7) CLOSE DW-27, WELL WATER HOSE CONNECTION TREE BYPASS. ____

8.4.2.2 (Continued)

INIT VERI

CAUTION

When Deepwell Water is being supplied to the AFW Pumps, the MDAFW Pumps will have no cooling water to the oil coolers or sealing water to the seals. Under this condition lube oil temperature from the cooler to the bearing should not exceed 140 °F (IAW Tech Manual).

NOTE: Below are the **MAXIMUM** flow rates to prevent pump runout **AND** possible damage to the deepwell pumps.

Number of running deepwell pumps	1 (200 gpm)	2 (400 gpm)	3 (600 gpm)
SDAFW Pump (ONLY) (165 gpm Recirc + 90 gpm leakoff)	N/A	145 gpm	345 gpm
2 MDAFW Pumps (120 gpm Recirc)	80 gpm	280 gpm	480 gpm NOTE 1
1 MDAFW Pump (60 gpm Recirc)	140 gpm	325 gpm NOTE 1	325 gpm NOTE 1

NOTE 1: Flow no more than 325 gpm per MDAFW pump to prevent trip on overcurrent

d. Based on the above limitations, START AFW Pumps as follows:

1) **IF** SDAFW Pump is to be used, **THEN** PERFORM the following:

.a) REMOVE cap **AND** OPEN AFW-7, SDAFW PUMP SUCTION VENT. ____

.b) **WHEN** a solid stream of water issues, **THEN** CLOSE AFW-7 **AND** INSTALL the cap. ____ ____

8.4.2.2.d.1 (Continued) INIT VERI

.c) START the SDAFW Pump as follows:

.1 **IF** desired, **THEN** OPEN V1-8A, STEAM SHUTOFF. ____

.2 **IF** desired, **THEN** OPEN V1-8B, STEAM SHUTOFF. ____

.3 **IF** desired, **THEN** OPEN V1-8C, STEAM SHUTOFF. ____

.d) OPEN AFW-18, SDAFW PUMP VENT. ____

.e) **WHEN** a solid stream of water issues, **THEN** CLOSE AFW-18. ____ ____

CAUTION

If the starting limitation stated in the Precautions and Limitations Section are exceeded, motor damage can occur due to motor overheating.

NOTE: The maximum flow rate when RCS temperature is less than or equal to 350°F is 100 gpm.

If the ventilation unit for the train of MDAFW Pump started is not operable, the opposite train of ventilation can be started by placing its RUN/AUTO switch on the respective power supply breaker to RUN.

2) **IF** MDAFW Pump "A" is to be used, **THEN** PERFORM the following:

.a) REMOVE cap **AND** OPEN AFW-34, AFW PUMP "A" VENT. ____

.b) **WHEN** a solid stream of water issues, **THEN** CLOSE AFW-34. ____

.c) START MDAFW Pump "A". ____

.d) **WHEN** MDAFW Pump "A" has been started, **THEN** OPEN AFW-34, AFW PUMP "A" VENT. ____

.e) **WHEN** a solid stream of water issues, **THEN** CLOSE AFW-34 **AND** INSTALL the cap. ____ ____

8.4.1.2.d (Continued) INIT VERI

3) **IF** MDAFW Pump "B" is to be used, **THEN** PERFORM the following:

   .a) REMOVE cap from **AND** OPEN AFW-35, AFW PUMP "B" VENT. ____

   .b) **WHEN** a solid stream of water issues, **THEN** CLOSE AFW-35. ____

   .c) START MDAFW Pump "B". ____

   .d) **WHEN** MDAFW Pump "B" has been started, **THEN** OPEN AFW-35, AFW PUMP "B" VENT. ____

   .e) **WHEN** a solid stream of water issues, **THEN** CLOSE AFW-35 **AND** INSTALL the cap. ____ ____

4) CHECK that AFW Pump Area Cooling Unit for the operating Motor Driven AFW pump(s) is OPERATING. ____

5) **IF** SW is not available, **THEN** align Emergency Cooling Water to the MDAFW Pumps IAW AOP-022. ____

6) **IF** the lube oil temperature of MDAFW Pump from the Lube Oil Cooler to the Bearings, exceeds 140 °F, **THEN** STOP the pump. ____

INIT VERI

3. Instructions for Removing Deepwell Pumps

a. VERIFY the AFW Pumps are STOPPED.

- SDAFW ____
- MDAFW Pump "A" ____
- MDAFW Pump "B" ____

b. VERIFY both AFW Pump room ventilation are OFF.

HVH-7A ____

HVH-7B ____

c. PERFORM the following valve lineup:

1) LOCK CLOSED DW-19, DEEPWELL EMERGENCY BACKUP TO AFW SUCTION. ____ ____

2) LOCK CLOSED DW-21, AFW SUCTION FROM DEEPWELL EMERGENCY BACKUP. ____ ____

3) OPEN DW-20, AFW SUCTION FROM DEEPWELL BACKUP TELL-TALE DRAIN. ____ ____

4) LOCK OPEN AFW-1, AFW PUMPS SUCTION FROM CST. ____ ____

5) LOCK OPEN AFW-104, AFW PUMPS SUCTION FROM CST. ____ ____

6) OPEN DW-22, WELL WATER HOSE CONNECTION TREE INLET. ____

INIT

d. NOTIFY the CRSS/SSO that if plant conditions allow, the Action Statement may be exited **AND** RECORD the time.

Time _____ _____

e. VERIFY all independent verifications are complete. _____

	Initials	Name (Print)	Date
Performed By:	_____	__________________________	__________
	_____	__________________________	__________
	_____	__________________________	__________

Approved By: __________________________ __________

Superintendent Shift Operations Date

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM COM-B.2.c

Remove the Halon Suppression System from Service (OP-804)

CANDIDATE: ______________________________

EXAMINER: ______________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task: Remove the Halon Suppression System from Service (OP-804)

Alternate Path: NONE

Facility JPM #: IP-083

K/A Rating: 086A4.06 Importance: SRO 3.2 RO 3.2

K/A Statement: Ability to manually operate and/or monitor in the control room: Halon system

Task Standard: Halon Suppression System for Zone 19 has been removed from service.

Preferred Evaluation Location: Simulator ____ In Plant X

Preferred Evaluation Method: Perform ____ Simulate X

References: OP-804, Halon Suppression System

Validation Time: 20 minutes Time Critical: NO

Candidate: ____________________

Time Start: ________ Time Finish: ________

Performance Time: ________ minutes

Performance Rating: SAT ________ UNSAT ________

Comments: ____________________

____

Examiner: ____________________ Date: ________

Signature

Tools/Equipment/Procedures Needed:

OP-804
Tools Required to Remove Pneumatic Actuators (adjustable wrenches)

READ TO OPERATOR

DIRECTION TO CANDIDATE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

DO NOT operate actual plant equipment unless specifically authorized to do so. Follow standard ALARA practices in the RCA.

INITIAL CONDITIONS:

Maintenance requires Zone 19 of the Halon Suppression System to be removed from service.

The Inside Auxiliary Operator is available to assist with the performance of any tasks inside the RCA.

INITIATING CUES:

You are to to remove Zone 19 of the Halon Suppression System from service in accordance with Section 8.3.1 of OP-804, "Halon Suppression System."

START TIME: ________

STEP 1: Locates proper procedure and required information STANDARD: Locates OP-804 and tools required to remove pneumatic actuators NOTES: COMMENTS:	____ SAT ____ UNSAT
STEP 2: Verify Zone 19 is inhibited by placing the INHIBIT switch on FDAP-A2 to the INHIBIT position (**Step 8.3.1.2**) STANDARD: Places INHIBIT switch on FDAP-A2 to the INHIBIT position NOTES: ***CUE: SWITCH HAS BEEN PLACED IN INHIBIT POSITION.*** **CRITICAL TO PREVENT ACTUATION WHILE REMOVING ACTUATORS.** ***NOTE: Causes a Control Room alarm.*** COMMENTS:	**CRITICAL STEP** ____ SAT ____ UNSAT

STEP 3:	Place the Zone 19 Suppression Releasing Module (RM-30RU) switches on FDAP-A2 and FDAP-B2 to the DISCONNECT Position - FDAP-A2 - FDAP-B2 (**Step 8.3.1.3**)	**CRITICAL STEP**
STANDARD:	Places switch for Suppression Releasing Module on FDAP-A2 to the DISCONNECT position and directs the Inside AO to place FDAP-B2 to DISCONNECT	
NOTES:	***CUE: SWITCHES HAVED BEEN PLACED IN DISCONNECT POSITION.*** **CRITICAL TO PREVENT ACTUATION WHILE REMOVING ACTUATORS.**	____ SAT
COMMENTS:		____ UNSAT
STEP 4:	Disconnect the Manual Pneumatic Actuator Valves from the cylinders in cylinder slots A-4, A-5, B-4, and B-5 - FPHS-18 (Cylinder Slot A-4) - FPHS-20 (Cylinder Slot A-5) - FPHS-26 (Cylinder Slot B-4) - FPHS-28 (Cylinder Slot B-5) (**Step 8.4.1.4**)	**CRITICAL STEP**
STANDARD:	Uses proper tools and disconnects actuator valves from cylinders in slots A-4, A-5, B-4, and B-5	
NOTES:	***CUE: ACTUATOR VALVES HAVE ALL BEEN DISCONNECTED AND ARE HANGING BY HOSES.*** **CRITICAL TO PREVENT ACTUATION AFTER PANEL RESTORATION.**	____ SAT
COMMENTS:		____ UNSAT

STEP 5:	Disconnect the Pilot Actuator connectors from the cylinders in cylinder slots A-6, A-7, B-6, and B-7 - A-6 - A-7 - B-6 - B-7 (**Step 8.4.1.5**)	**CRITICAL STEP**
STANDARD:	Uses proper tools and disconnects the small flex lines (pilot actuator connectors) from cylinders in slots A-6, A-7, B-6, and B-7	
NOTES:	***CUE: ALL SMALL FLEX LINES HAVE BEEN DISCONNECTED.*** **CRITICAL TO PREVENT ACTUATION AFTER PANEL RESTORATION.**	____ SAT
COMMENTS:		____ UNSAT
STEP 6:	Close ball valves FPHS-7 and FPHS-10 - FPHS-7 - FPHS-10 (**Step 8.4.1.6**)	**CRITICAL STEP**
STANDARD:	Rotates handwheel for FPHS-7 and FPHS-10 90° to closed position	
NOTES:	***CUE: SEALS HAVE BEEN BROKEN AND HANDWHEELS HAVE BEEN ROTATED 90° TO CLOSED POSITION.*** **CRITICAL TO PREVENT FLOW AFTER RESTORATION OF PANEL.**	____ SAT
COMMENTS:		____ UNSAT

STEP 7:	Return the Zone 19 Suppression Releasing Module (RM-30RU) Disconnect Switches to the NORMAL position - FDAP-A2 - FDAP-B2 (**Step 8.4.1.7**)	**CRITICAL STEP**
STANDARD:	Places switch for Suppression Releasing Module on FDAP-A2 and directs Inside AO to place FDAP-B2 to the NORMAL position	
NOTES:	***CUE: SWITCHES HAVED BEEN PLACED IN NORMAL POSITION.*** **CRITICAL TO RESTORE PANEL TO NORMAL AFTER REMOVING ACTUATORS.**	____ SAT
COMMENTS:		____ UNSAT
	END OF TASK	

STOP TIME: ________

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

Maintenance requires Zone 19 of the Halon Suppression System to be removed from service.

The Inside Auxiliary Operator is available to assist with the performance of any tasks inside the RCA.

INITIATING CUES:

You are to to remove Zone 19 of the Halon Suppression System from service in accordance with Section 8.3.1 of OP-804, "Halon Suppression System."

DO NOT operate actual plant equipment unless specifically authorized to do so.

CP&L

M
Multiple Use

CAROLINA POWER & LIGHT COMPANY
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 3
PART 2

OPERATING PROCEDURE

OP-804

HALON SUPPRESSION SYSTEM

REVISION 15

SUMMARY OF CHANGES
DCF # 2000P0587

STEP #	REVISION COMMENTS
OLD 8.1.1.24	Deleted checking alarms and any associated actions on transceivers. The deletion of the Transceiver Lights is justified under USQD Screen 00-0584. All other changes are administrative in nature.
Throughout	Revised action verbs to all caps to meet AP-007 criteria
2.7, 2.8, 2.9., 2.10 NOTE 8.4.1.1	Added references for Instructional aids 99-OP-06 & 7. Revised the titles of the IA's to clarify location.
Section 8.4.1, 8.4.2, 8.4.3	Revised usage level to Reference Use.
Attachments 10.2 through 10.5	Upgraded the drawings to improve clarity.

TABLE OF CONTENTS

1.0 PURPOSE

The purpose of this procedure is to provide instructions for the startup, normal operation, shutdown, and infrequent operation of the Halon 1301 Suppression System.

2.0 REFERENCES

2.1 FSAR, Section 9.5.1.4.2.6.2

2.2 OP-802, Fire Detection and Actuation System

2.3 FP-012, Fire Protection Systems Minimum Equipment and Compensatory Actions

2.4 ACR 92-358, Fire Protection System, CO_2 Leak in Pipe Alley

2.5 OST-630, Halon 1301 Suppression System Weight Test

2.6 CR 95-470, CO_2 System Actuation - Pipe Alley

2.7 Instructional Aid 96-OP-06, Initiating the Halon System for Unit 2 Cable Spreading Room (Zone 19) from the Cylinder Storage Area

2.8 Instructional Aid 96-OP-07, Initiating the Halon System for E1/E2 Room (Zone 20) from the Cylinder Storage Area

2.9 Instructional Aid 99-OP-06, Initiating the Halon System for the Unit 2 Cable Spreading Room (Zone 19) from the FDAP panels.

2.10 Instructional Aid 99-OP-07, Initiating the Halon System for the E1/E2 Room (Zone 20) from the FDAP panels.

2.11 CR-96-00002, Control of Instructional Aids

3.0 RESPONSIBILITIES

N/A

4.0 PREREQUISITES

N/A

5.0 PRECAUTIONS AND LIMITATIONS

5.1 To prevent accidental actuation of the system, cylinders located in slots A-1, A-2, A-4, A-5, B-1, B-2, B-4 and B-5 shall have the 3/16" flex hose disconnected from the solenoid assembly outlet port before the solenoid assembly is connected to the cylinder valve assembly. (ACR 92-358)

5.2 Failure to properly install the Manual Pneumatic Actuator Valves and Solenoid Pilot Valves on the Pilot Cylinders (located in slots A-1, A-2, A-4, A-5, B-1, B-2, B-4, and B-5), per Attachment 10.2 could result in damaging the head of the cylinders and may actuate the system.

5.3 On the "slave" cylinders, a pressure gauge is substituted where the Solenoid Pilot Valves tie in, and the threaded male connection for the Manual Pneumatic Actuator Valve is capped. The pressure gauge shall be connected to the correct threaded connection.

5.4 Failure to properly install the cylinder head, pressure gauges and connections (located in slots A-6 through A-10 and B-6 through B-10) per Attachment 10.3, could result in damage to the cylinder heads and may actuate the system. The "slave" cylinders do not have a pilot actuation line.

5.5 To prevent inadvertent actuation, ensure that the Manual Pneumatic Actuator Valves (located slots A-1, A-2, A-4, A-5, B-1, B-2, B-4, and B-5) are in the non-actuated (lever reset and safety pin in place) position prior to installation.

5.6 Although personnel are not endangered by the concentrations of Halon used in this system, ensure that all personnel leave the area prior to manual actuation of the system or immediately upon activation of the warning horn/strobe. Re-entry shall be made only by or under the supervision of qualified Fire Protection personnel.

5.7 Any steps not applicable shall be marked N/A per OMM-001-15 and the reason(s) noted at the end of the section.

5.8 When the introduction of foreign materials is undesirable, openings left unattended for any period of time shall be covered with suitable material to prevent inadvertent introduction of foreign materials. Rags, towels or other similar materials shall not be stuffed into an opening to be used as a cover. (Reference ACR 92-358)

5.9 This procedure has been screened IAW PLP-037 criteria and determined not applicable to PLP-037.

6.0 SPECIAL TOOL AND EQUIPMENT

- CO2/Halon Cylinder Stem Gage for checking discharge head piston stems
- Thermometer for Pressure Compensation when using Attachment 10.1

7.0 ACCEPTANCE CRITERIA

N/A

INIT

8.3 SHUTDOWN

8.3.1 Removing Zone 19 of the Halon Suppression System From Service

1. This revision has been verified to be the latest revision available.

Name (Print)	Initial	Signature	Date

2. VERIFY Zone 19 is inhibited by placing the INHIBIT switch on FDAP-A2 to the INHIBIT position. ____

3. PLACE the Zone 19 Suppression Releasing Module (RM-30RU) switches on FDAP-A2 and FDAP-B2 to the DISCONNECT Position.

   – FDAP-A2 ____

   – FDAP-B2 ____

4. DISCONNECT the Manual Pneumatic Actuator Valves from the cylinders in cylinder slots A-4, A-5, B-4, and B-5.

   – FPHS-18 (Cylinder Slot A-4) ____

   – FPHS-20 (Cylinder Slot A-5) ____

   – FPHS-26 (Cylinder Slot B-4) ____

   – FPHS-28 (Cylinder Slot B-5) ____

8.3.1 (Continued)

INIT

5. DISCONNECT the Pilot Actuator connectors from the cylinders in cylinder slots A-6, A-7, B-6, and B-7.

   - A-6 ____
   - A-7 ____
   - B-6 ____
   - B-7 ____

6. CLOSE ball valves FPHS-7 and FPHS-10.

   - FPHS-7 ____
   - FPHS-10 ____

7. RETURN the Zone 19 Suppression Releasing Module (RM-30RU) Disconnect Switches to the NORMAL position.

   - FDAP-A2 ____
   - FDAP-B2 ____

	Initials	Name (Print)	Date
Performed by:	____	____________________	____
	____	____________________	____
	____	____________________	____
Approved by:	____	____________________	____
		Superintendent Shift Operations	Date

INIT

8.3.2 Removing Zone 20 of the Halon Suppression System From Service

1. This revision has been verified to be the latest revision available.

Name (Print)	Initial	Signature	Date

2. VERIFY Zone 20 is inhibited by placing the INHIBIT switch on FDAP-A1 to the INHIBIT position. ____

3. PLACE Zone 20 Suppression Releasing Module (RM-30RU) on FDAP-A1 and FDAP-B1 to the DISCONNECT position.

   – FDAP-A1 ____

   – FDAP-B1 ____

4. DISCONNECT the Manual Pneumatic Actuator Valves from cylinders in cylinder slots A-1, A-2, B-1, and B-2.

   – FPHS-14 (Cylinder Slot A-1) ____

   – FPHS-16 (Cylinder Slot A-2) ____

   – FPHS-22 (Cylinder Slot B-1) ____

   – FPHS-24 (Cylinder Slot B-2) ____

8.3.2 (Continued)

INIT

5. DISCONNECT the Pilot Actuator Connectors from cylinders in cylinder slots A-6, A-7, A-9, A-10, B-6, B-7, B-9, and B-10.

   – A-6 ____
   – A-7 ____
   – A-9 ____
   – A-10 ____
   – B-6 ____
   – B-7 ____
   – B-9 ____
   – B-10 ____

6. CLOSE ball valves FPHS-1 and FPHS-4.

   – FPHS-1 ____
   – FPHS-4 ____

7. RETURN Zone 20 Suppression Releasing Module (RM-30RU) Disconnect Switches to the NORMAL position.

   – FDAP-A1 Zone 20 ____
   – FDAP-B1 Zone 20 ____

	Initials	Name (Print)	Date
Performed by:	____	________	____
	____	________	____
	____	________	____
Approved by:	____	________ Superintendent Shift Operations	____ Date