January 20, 2000

NOTE TO: NRC Document Control Desk
Mail Stop 0-5-D-24

FROM: Beverly Michael, Licensing Assistant, Operator Licensing and Human Performance Branch, Division of Reactor Safety, Region II

Beverly Michael

SUBJECT: OPERATOR LICENSING EXAMINATIONS ADMINISTERED AT THE VOGTLE ELECTRIC GENERATING PLANT, DOCKET #50-424 AND 50-425 - DECEMBER 1999

During the period December 13 - 16 and 21, 1999, Operator Licensing Examinations were administered at the referenced facility. Attached, you will find the following information for processing through NUDOCS and distribution to the NRC staff, including the NRC PDR:

Item #1 - a) Facility submitted outline and initial exam submittal, designated for distribution under RIDS Code A070.

b) As given operating examination, designated for distribution under RIDS Code A070.

Item #2 - Examination Report with the as given written examination attached, designated for distribution under RIDS Code IE42.

Attachments: As stated

As given operating examination, designated for distribution under RIDS Code A070

DISTRIBUTION CODE
A070

Facility: __ ____VOGTLE________________		Date of Examination: ____________
Examination Level (circle one): RO / **SRO**		Operating Test Number: ________
Administrative Topic/Subject Description		Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions
A.1	Conduct of Operations	Perform a Shutdown Margin Calculation in Mode 3
	Conduct of Operations	Evaluate Overtime Guidelines
A.2	Equipment Control	Clearance Review and Verification
A.3	Radiation Control	Calculate expected personnel exposure with and without use of a respirator for maintenance activity in high radiation airborne contamination area
A.4	Emergency Plan	PARS

DISTRIBUTION CODE
A070

Facility: __ ____VOGTLE_______________		Date of Examination: __________
Examination Level (circle one): RO /SRO		Operating Test Number: ______

Administrative Topic/Subject Description		Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions
A.1	Conduct of Operations	Perform a Shutdown Margin Calculation in Mode 3
	Conduct of Operations	Evaluate Overtime Guidelines
A.2	Equipment Control	Clearance Review and Verification
A.3	Radiation Control	Calculate expected personnel exposure with and without use of a respirator for maintenance activity in high radiation airborne contamination area
A.4	Emergency Plan	Complete ENN Form within allowable Time Site Area Emergency

PLANT VOGTLE

CONTROL ROOM OPERATOR

JOB PERFORMANCE MEASURE

Calculate Shutdown Margin

OPERATOR'S NAME: ______________________________

EVALUATION DATE: ___/___/___

JPM TITLE: Calculate Shutdown Margin

COMPLETION TIME: 20 minutes

Application: **RO/SRO**

K/A Number: 192002K113 RO: 3.5 SRO: 3.7
10CFR55.45 Ref.: 12

Evaluation Method [ ] Performed [ ] Simulated

Evaluation Location [ ] Simulator [ ] Control Room [ ] Unit 1 [ ] Unit 2

Performance Time: ______minutes

OVERALL JPM EVALUATION

[ ] SATISFACTORY **[ ] UNSATISFACTORY**

Examiner Comments:

Examiner's Signature: ______________________________

Directions to Operator

This information describes the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the task before beginning. You will be allowed access to any item normally used to perform this task.

Initial Conditions: A reactor shutdown to Mode 3 has been performed.

Assigned Task: The USS directs you to calculate Shutdown Margin using procedure 14005".

Examiner's Copy

You will be given information describing the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the assigned task before beginning. You will be allowed access to any item normally used to perform this task.

Initial Conditions: A reactor shutdown to Mode 3 has been performed.

Assigned Task: The USS directs you to calculate Shutdown Margin using procedure 14005".

Task Standard: Shutdown margin correctly calculated.

Required Items:	1.	14005, Shutdown Margin and Keff Calculations
	2.	Plant Technical Data Book (Unit 1)

Simulator Setup: Performance of this JPM does not require the simulator.

This JPM is based on Unit 1 Cycle 9 data.

START TIME: ___________

STEP 1
CRITICAL ( )
SAT UNSAT
Select appropriate Data Sheet
@ Data Sheet 2 selected
@ Current conditions recorded *(1)*
@ Use Data Sheet 5 to calculate percent Xenon Power (87.9)

CUES:

(1) If asked, "Xenon worth should be considered in the calculation".

STEP 2

SAT UNSAT
Determine reactivity values using PTDB
Note: If a discrepency exist in the values of this JPM and the values calculated by the examinee, all work performed by the examinee should be collected and evaluated to determine where error exist. If the error is determined to be a math or interpolation error and the error does not affect the acceptance criteria, then the JPM should be considered as satisfactory. If the error is due to improper usage of the procedure or the tables in the PTDB, then the JPM should be considered unsatisfactory.
@ Current integral boron worth (E1) of 1968 pcm

@ Critical integral boron worth (E3) of 3944 pcm

@ Corrected xenon and samarium worth (E8) of 4542 pcm

@ Stuck rod worth (E10) of 0 pcm

@ Axial offset reactivity correction factor (E11) of 0 (1)

CUE:

"Reactor Engineering has calculated the axial offset correction factor to be 0 pcm"

STEP 3
CRITICAL ( )
SAT UNSAT
Determine Shutdown Margin
Note: Interpolation and rounding may result in values slightly different from those provided.
@ Shutdown margin of ~ 2.34% calculated

STEP 4
SAT UNSAT
Report to USS
@ Shutdown margin calculation complete. (Value must be grater than COLR value of 1.30%.

STOP TIME: ________________

Field Notes

Power History	100% for 200 days
Cycle Burnup	20,000 MWD/MTU
Boron Concentration	200 ppm
Tavg	557 °F
Current Rod Height	All Rods at Bottom
Delta AO x Delta Bu	0 %MWD/MTU

A plant shutdown to Mode 3 was initiated 4 hours ago. The reactor was declared shutdown 1 hour ago when the PR NIS detectors indicated 0% reactor power. All 4 RCPs are in service. The power history during the shutdown is as follows:

Time (hrs)	Average Power
0 - 1	0%
1 - 2	33%
2 - 3	66%
3 - 4	100%
> 4	100%

* ANSWER KEY

DATA SHEET 2 Sheet 1 of 4

SHUTDOWN MARGIN IN MODES 3, 4, AND 5
AND KEFF IN MODES 3, 4, AND 5 WITH ALL RODS IN

C. **CONDITIONS PRIOR TO SHUTDOWN**

C.1 Date ________ Time ________

C.2 Cycle Burnup 20000 MWD/MTU
(From Reactor Engineering)

C.3 Power Level 100 % Xenon Equilibrium? [√] YES [ ] NO

C.4 Xenon Power 88
(Same as (C.3) if in Xenon Equilibrium; otherwise use Data Sheet 5 OR attach printout from Plant Computer)

D. **CURRENT/PROJECTED CONDITIONS** (circle one)

D.1 Date ________ Time ________

D.2 Core Average Temperature 557 °F

D.3 Mode 3

D.4 Length of Shutdown 1 hours

D.5 Boron Concentration 200 ppm

D.6 Number of Actual Untrippable Rods 0

D.7 Number of Running Reactor Coolant Pumps (RCPs) 4

DATA SHEET 2 Sheet 2 of 4

E. SHUTDOWN MARGIN AND KEFF BY CALCULATION

NOTES

a. If in Mode 3, 4 or 5 AND no credit is taken for Xenon or Samarium AND the Number of Actual Untrippable Rods (D.6) is zero, then Section F may be performed instead of Section E for Shutdown Margin.

b. For all calculations, record the <u>ABSOLUTE VALUES</u> of the reactivity values obtained from the PTDB.

E.1 Xe/Sm free Integral Boron Worth at ARI, Temperature (D.2), Current or Projected Boron Concentration (D.5) and Burnup (C.2) (PTDB TAB 1.3.1) + 1968 pcm

E.2 Xe/Sm free Critical Boron Concentration at ARI-1, Temperature (D.2) and Burnup (C.2) (PTDB TAB 1.3.2) + 406 ppm

E.3 Xe/Sm free Integral Boron Worth at ARI, Temperature (D.2), Critical Boron Concentration (E.2) and Burnup (C.2) (PTDB TAB 1.3.1) + 3944 pcm

E.4 Correction factor for Boron effect on Xenon and Samarium at Critical Boron Worth (E.3) (PTDB TAB 1.4.5) + .95721

E.5 Boron free Xenon Worth at (D.4) hours after shutdown from Xenon Power (C.4) and Burnup (C.2) (PTDB TAB 1.4.1) + 3506 pcm

E.6 IF CYCLE BURNUP (C.2) IS GREATER THAN OR EQUAL TO 2000 MWD/MTU, enter Boron free Samarium Worth at zero hours after shutdown from 100% power for Burnup (C.2) (PTDB TAB 1.4.4) + 1036 pcm

- OR -

IF CYCLE BURNUP (C.2) IS LESS THAN 2000 MWD/MTU, enter zero + ______ pcm

E.7 Total Xenon plus Samarium Worth: [(E.5) + (E.6)] + 4542 pcm

E.8 Corrected Xenon plus Samarium Worth: [(E.4) x (E.7)] + 4320 pcm

E.9 Worth of most reactive rod at Burnup (C.2)(PTDB TAB 1.5.3) + 889 pcm

4542 .95721

DATA SHEET 2 Sheet 3 of 4

E.10 Worth of Actual Untrippable Rods:

IF HAVE UNTRIPPABLE RODS:
[{(D.6) x (E.9) x 1.35} + {(E.9) x 0.35}]

[______ x ______x 1.35] + [______ x 0.35] =

OTHERWISE: 0 + 0 pcm

E.11 Axial Offset Reactivity Correction (From Reactor Engineering) + 0 pcm

E.12 Shutdown Reactivity:

[(E.1) - (E.3) + (E.8) - (E.10) - (E.11)] =

1968 - 3944 + ~~4085~~ 4320 - 0 - 0 = ( ) 2344 pcm

E.13 Shutdown Margin: [(E.12) / 1000.0] ( ) 2.344%

E.14 Keff: 1.0000 / (1.0000 + [(E.12)/100,000]) = 2909

1.0000 / [1.0000 + (______ / 100,000)] = + .977

ACCEPTANCE CRITERIA

For Mode 3, 4 or 5, Shutdown ~~Margin~~ (E.13) shall be greater than or equal to the limit specified in the COLR per Technical Specification LCO 3.1.1 (COLR 2.2.1): + 1.30 % (fill in)

For Mode 3, 4 or 5, Keff (E.14) shall be less than +0.99.

[✓] YES [ ] NO

Completed By: ______ Signature Date/Time

Verified By: ______ Signature Date/Time

PLANT VOGTLE

CONTROL ROOM OPERATOR

JOB PERFORMANCE MEASURE

Evaluate Overtime Eligibility

OPERATOR'S NAME: ______________________________

EVALUATION DATE: ___/___/___

JPM TITLE: Evaluate Overtime Eligibility Guidelines

COMPLETION TIME: 15 minutes

Application: **RO/SRO**

K/A Number: GEN 2.1.5 RO: 2.3 SRO: 3.4
10CFR55.45 Ref.: 12

Evaluation Method [ ] Performed [ ] Simulated

Evaluation Location [ ] Simulator [ ] Control Room [ ] Unit 1 [ ] Unit 2

Performance Time: _____minutes

OVERALL JPM EVALUATION

[ ] SATISFACTORY [ ] UNSATISFACTORY

Examiner Comments:

Examiner's Signature: ______________________________

Directions to Operator

This information describes the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the task before beginning. You will be allowed access to any item normally used to perform this task.

Initial Conditions: A startup is planned for the oncoming shift. One reactor operator must be held over two hours for the startup. The following is the work history (excluding shift turnover time) of the operators on shift. A break of at least 8 hours occurred between all work periods. All operators began their schedule at the same time each day.

Day	1	2	3	4	5	6	7	8 (today)
Operator #1	0	0	12	12	12	8	14	10
Operator #2	0	0	12	12	12	12	8	14
Operator #3	0	0	12	12	12	8	8	15
Operator #4	0	8	12	10	10	8	10	12
Operator #5	0	4	12	10	10	14	10	12

Assigned Task: Evaluate work histories for the operators and determine which operator(s) if any may be held over for 2 hours for the startup without prior overtime approval.

Examiner's Copy

You will be given information describing the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the assigned task before beginning. You will be allowed access to any item normally used to perform this task.

Initial Conditions: A startup is planned for the oncoming shift. One reactor operator must be held over two hours for the startup. The following is the work history (excluding shift turnover time) of the operators on shift. A break of at least 8 hours occurred between all work periods. All operators began their schedule at the same time each day.

Assigned Task: Evaluate work histories for the operators and determine which operator(s) if any may be held over for 2 hours for the startup without prior overtime approval.

Day	1	2	3	4	5	6	7	8 (today)
Operator #1	0	0	12	12	12	8	14	10
Operator #2	0	0	12	12	12	12	8	14
Operator #3	0	0	12	12	12	8	8	15
Operator #4	0	8	12	10	10	8	10	12
Operator #5	0	4	12	10	10	14	10	12

Task Standard: Individuals selected must not exceed any of the following work hours restrictions:

>16 HOURS IN A 24 HOUR PERIOD
>24 HOURS IN A 48 HOUR PERIOD
>72 HOURS IN A 7 DAY PERIOD

Required Items:	1.	00005, Overtime Authorizations
	2.	Technical Specification 5.2.2

Simulator Setup: Performance of this JPM does not require the simulator.

START TIME: __________

STEP 1	
SAT	**UNSAT**
Compare Operator 1 hours to TS requirements	
@	Recognize that operator 1 was not eligible because the additional 2 hours would exceed 24 hours in a 48 hour period .

STEP 2	
SAT	**UNSAT**
Compare Operator 2 hours to TS requirements	
@	Recognize that operator 2 would not exceed any work hour limits and is elgible to work the additional 2 hours for unit startup.
@	Operator 2 may be held over without prior management approval.

STEP 3	
SAT	**UNSAT**
Compare Operator 3 hours to TS requirements	
@	Recognize that operator 3 was not eligible because the additional 2 hours would exceed 16 hours in a 24 hour period.

STEP 4	
SAT	**UNSAT**
Compare Operator 4 hours to TS requirements	
@	Recognize that operator 4 would not exceed any work hour limits and is eligible to work the additional 2 hours for unit startup.
@	Operator 4 may be held over without prior management approval.

STEP 5	
SAT UNSAT	
Compare Operator 5 hours to TS requirements	
@	Recognize that operator 5 was not eligible because the additional 2 hours would exceed 72 hours in a 7 day period.
@	Operator 5 work hours are in excess of TS limits.

STEP 6
SAT UNSAT
Determines that operators #2 and #4 may be held over for two hours without exceeding work hour restrictions.

STOP TIME: ______________

Field Notes

PLANT VOGTLE

CONTROL ROOM OPERATOR

JOB PERFORMANCE MEASURE

Clearance Review and Verification

OPERATOR'S NAME: ______________________________

EVALUATION DATE: ___/___/___

JPM TITLE: Clearance Review and Verification

COMPLETION TIME: 20 minutes

Application: **RO/SRO**

K/A Number: GEN 2.2.13 RO: 3.6 SRO: 3.8
10CFR55.45 Ref.: 13

Evaluation Method [ ] Performed [ ] Simulated

Evaluation Location [ ] Simulator [ ] Control Room [ ] Unit 1 [ ] Unit 2

Performance Time: ______minutes

OVERALL JPM EVALUATION

[ ] SATISFACTORY [ ] UNSATISFACTORY

Examiner Comments:

Examiner's Signature: ______________________________

Directions to Operator

This information describes the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the task before beginning. You will be allowed access to any item normally used to perform this task.

Initial Conditions: During the upcoming Unit 1 refueling outage, MDAFW Pump A is tagged out to allow disassembly and repair of an AFW Train A miniflow manual isolation valve (1-1302-U4-054) along with disassembly and repair of 1-HV-5119 suction MOV from CST # 2 which is leaking by the seat. VOTES testing of this MOV will follow. The clearance has been prepared by personnel at C&T to allow work on 2 AFW valves on Train A.

1-HV-5119

1-1302-U4-054

Assigned Task: The USS directs you to review the clearance to insure the clearance points are adequate to properly isolate the components being repaired.

Examiner's Copy

You will be given information describing the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the assigned task before beginning. You will be allowed access to any item normally used to perform this task.

Initial Conditions: During the upcoming Unit 1 refueling outage, MDAFW Pump A is tagged out to allow disassembly and repair of an AFW Train A miniflow manual isolation valve (1-1302-U4-054) along with disassembly and repair of 1-HV-5119 suction MOV from CST # 2 which is leaking by the seat. VOTES testing of this MOV will follow. The clearance has been prepared by personnel at C&T to allow work on 2 AFW valves on Train A

1-HV-5119

1-1302-U4-054

Assigned Task: The USS directs you to review the clearance to insure the clearance points are adequate to properly isolate the components being repaired.

Task Standard: Clearance reviewed and any errors or omissions identified.

CLEARANCE SHEET

Clearance # 19991234	Equipment Number: 11302P4003
Equipment Description: AUX FEEDWATER PUMP MOTOR DRIVEN TRAIN A	
Reason For Clearance (include WO No.): PERFORM MOV TESTING AND SEAT WORK ON 1HV5119 (WO# 19990069) AND WORK ON MANUAL VALVE 11302u4054 (WO#19990070)	

Additional WOs:

Requested by: L.F. RAY	Extension: 3922	Beeper:565

Requires LCO: ☐ Yes ☐ No	Locked Valves: ☐ Yes ☐ No	Fire Protection Impaired: ☐ Yes ☐ No	IV Required: ☐ Yes ☐ No
Prepared by: T.N. THOMPSON	Date: 12/12/99	Reviewed by:	Date:
Authorized by:		Date:	Time:
Installed by:		Date:	Time:
Verified by:		Date:	Time:

SUBCLEARANCES

NAME
Printed in first space
Signature in second space

GROUNDING DEVICES VERIFIED REMOVED AND SUBCLEARANCE RELEASED BY:

PRINT AND SIGNATURE	WORK DOC	EXT.	DATE	TIME	SIGNATURE	DATE	TIME
1.							
2.							
3.							
4.							
5.							

COMMENTS:

1HV5119 SHOULD BE OPENED WHEN CLR IS HUNG TO ALLOW DRAINING OF PIPE BETWEEN 1HV5099 AND MDAFW PUMP A.

CLR# 19991222 WILL COVER WORK FOR MOV REPAIR, MOV PERSONNEL WILL NEED TO SIGN ONTO BOTH CLEARANCES AS A SCH.

Clearance #19991234	Prepared by: Jane Doe

EQUIPMENT TO BE CLEARED AND TAGGED					TAGS TO BE REMOVED AND EQUIPMENT RETURNED TO SERVICE AS SPECIFIED			
TAG #	EQUIPMENT #	TAGGED	INIT	IV INIT	RESTORE	RESTORE	INIT	IV INIT
01	1HS5131	P-T-L						
CONT SW (QMCB) TO MOTOR DRIVEN AFW PUMP 1-1302-P4-003-M01								
02	1HS5131B	CT. RM						
XFER CONT SW (PSDA1) FOR 1-1302-P4-003-M01								
03	1AA0217	DISC						
SWGR FDR BKR TO 1-1302-P4-003-M01								
04	1AA0215 RACK MECH	DISC						
SWGR FDR BKR TO 1-1302-P4-003-M01								
05	1AYE1-12	OFF						
AUX FDW PMP MTR PNL BKR MOTOR SPACE HEATER								
06	1HV5099	SHUT						
CONDENSATE, CST-2 SUPPLY, TO MDAFW PUMP A, SUCT ISO, NO								
07	1HV5095	SHUT						
AUX FEEDWATER, CST-1 TO, MDAFW PUMP A, SUCT ISO, NO								
08	11302U4035	SHUT						
AUX FEEDWATER, MOTOR DRIVEN, AFW PUMP A, DISCH ISO, NO								
09	11302U4096	SHUT						
AUX FEEDWATER, AMMONIA INJ, TO MDAFW, PUMP A DISCH, NC								
10	11302U4078	SHUT						
AUX FDW SYS, COND CHEM INJ, TO AFW PUMP, TURB DISCH, NC								
11	11302U4185	SHUT						
MDAFW A MINIFLO TO CST-2 ISO, NC								
12	11302U4181	SHUT						
AFW MDAFW PUMP A RECIRC TO CST-1, NO								
13	11302X4116	UC/OPEN						
AUX FEEDWATER, CST-2 TO, MDAFW PUMP A, SUCT DRAIN, NC								

Figure 2B (Example)

Clearance #	Prepared by:

EQUIPMENT TO BE CLEARED AND TAGGED				TAGS TO BE REMOVED AND EQUIPMENT RETURNED TO SERVICE AS SPECIFIED				
TAG #	EQUIPMENT #	TAGGED	INIT	IV INIT	RESTORE	RESTORE	INIT	IV INIT
14	11302X4123	OPEN						
AFW, MDAFW PUMP, MINIFLOW DRAIN ISO, NC								
15	11302X4124	UC/OPEN						
AUX FEEDWATER, MDAFW PUMP A, MIN FLOW, LINE DRAIN, NC								
16	11302X4163	OPEN						
AUX FEEDWATER, AMNA INJ TO, MDAFW PMP A, DISCH DRAIN, NC								
17	11302X4164	UC/OPEN						
AFW, CHEM INJ TO, MDAFW PUMP A, DISCH DRAIN, NC								
18	11302X4157	UC/OPEN						
CONDENSATE, MDAFW PUMP A, RECIRC TO, CST-2 DRAIN, NC								
19	11302X4115	UC/OPEN						
AUX FEEDWATER, CST-2 TO, MDAFW PUMP A, SUCT VENT, NC								
20	11302X4258	UC/OPEN						
AUX FEEDWATER, MDAFW PUMP A, RECIRC TO CST-2, VENT, NC								
21	11302X4159	UC/OPEN						
AFW, CST-2 TO, MDAFW PUMP A, SUCTION VENT, NC								
22	11302X4122	OPEN						
AFW, MDAFW PUMP A, DISCHARGE VENT ISO, NC								
23	11302X4121	UC/OPEN						
AFW, MDAFW PUMP A, DISCHARGE VENT, NC								
24	11302X4164	UC/OPEN						
AFW, MDAFW PUMP A, CASING VENT, NC								

Figure 2B (Example)

ANSWER KEY

TDAFW TAGOUT SCENARIO

During the upcoming 1R8 refueling outage MDAFW pump A is to be tagged out to allow disassembly and repair of an AFW Train A miniflow manual isolation valve (1-1302-U4-054) along with disassembly and repair of 1-HV-5119 suction MOV from CST # 2 which is leaking by the seat. VOTES testing of this MOV will follow.

NOTE: The following can be written as a note on the clearance or relayed as information to the candidate.

A note on clearance # 19915620 will call for 1-HV-5119 to be opened during draining of AFW system to allow suction line to drain for MOV work.

2nd note will state that MOV clearance 19915622 will cover work for MOV repair. No red hold tags are to be hung on 1-HV-5119. MOV personnel will need to sign onto both clearances.

Proposed clearance points (including errors denoted by #) as follows:

1)	1HS-5131A	HS for MDAFW A	PTL	
#2)	1HS-5131B	PSDA Sw for MDAFW A	Cont Room	(Wrong switch should be 5131C)
~~#3)~~	~~1AA0215~~	~~Aux Comp Clg Wtr Pmp A~~	~~Disconnect~~	~~(Should be 1AA0217)~~
#4)	1AA0215	Rack Mechanical	Disconnect	(Should be 1AA0217)
5)	1AYE112	AFW A Mtr Htr	Off	
6)	1HV-5095	CST # 1 Supply	Shut	
7)	1HV-5099	CST # 2 Supply	Shut	
8)	1-1302-U4-035	AFW A Disch	Shut	
9)	1-1302-U4-096	Amon & Hyd	Shut	
#10)	1-1302-U4-078	Chem Inj	Shut	(Should be 079)
11)	1-1302-U4-185	Minflow to CST # 2	L. C.	
#12)	1-1302-U4-181	Miniflow to CST # 1	Shut	(Should be 180, wrong train)

* ANSWER KEY

13)	1-1302-X4-116	Drain	UC & open	
14)	1-1302-X4-123	Drain	UC & open	
15)	1-1302-X4-124	Drain	UC & open	
16)	1-1302-X4-157	Drain	UC & open	
17)	1-1302-X4-163	Drain	UC & open	
18)	1-1302-X4-164	Drain	UC & open	
19)	1-1302-X4-115	Vent	UC & open	
20)	1-1302-X4-121	Vent	UC & open	
21)	1-1302-X4-122	Vent	UC & open	
22)	1-1302-X4-159	Vent	UC & open	
23)	1-1302-U4-164	Pump Casing Vent	UC & open	
20 #24)	1-1302-X4-258	Vent	UC & open	(Shouldn't be is TDAFW valve)

Note: Candidate may want to tag open other valves to assist in draining the MDAFW pump. This would be acceptable depending upon valves utilized.

~~Note: Clearance steps # 3 and # 4 would count as one critical step since it identifies the same breaker.~~

My recommended grading. Correctly identify 4 of 5 wrong clearance points for an 80% passing grade. If candidate adds/deletes any points other than those covered in notes above, evaluate points for impact on plant operations before determining final grade.

I would CONSIDER giving the candidate a marked up version of the prints like is done at C & T when they write a clearance. Of course we wouldn't have it marked up like mine with the mistakes identified. Just red highlights for the Hold Points, green for the flowpath, and the valve work circled in red ink. This is typically available to the person performing the review. I don't know what y'all did the last time.

PLANT VOGTLE

CONTROL ROOM OPERATOR

JOB PERFORMANCE MEASURE

Calculate Worker Dose in an Airborne Contamination Area

OPERATOR'S NAME: ________________________________

EVALUATION DATE: ___/___/___

JPM TITLE: Calculate Potential Worker Dose in an Airborne Contamination Area

COMPLETION TIME: 15 minutes

Application: **RO/SRO**

K/A Number: GEN 2.3.4 RO: 2.5 SRO: 3.1
10CFR55.45 Ref.: 10

Evaluation Method [ ] Performed [ ] Simulated

Evaluation Location [ ] Simulator [ ] Control Room [ ] Unit 1 [ ] Unit 2

Performance Time: ______minutes

OVERALL JPM EVALUATION

[ ] SATISFACTORY [ ] UNSATISFACTORY

Examiner Comments:

Examiner's Signature: ________________________________

Directions to Operator

This information describes the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the task before beginning. You will be allowed access to any item normally used to perform this task.

Initial Conditions: Work must be performed in an area where the dose rate is 60 mr/hr. Air samples have been taken and there is a small amount of airborne contamination in the area, 4.5 DAC. Previous maintenance records indicate that it takes 1 hour and 30 minutes to perform the job without a respirator and 1 hour and 45 minutes to perform this job with a respirator.

Assigned Task: The USS has directed you to "Calculate expected worker dose and determine whether or not a respirator should be used".

Examiner's Copy

You will be given information describing the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the assigned task before beginning. You will be allowed access to any item normally used to perform this task.

Initial Conditions: Work must be performed in an area where the dose rate is 60 mr/hr. Air samples have been taken and there is a small amount of airborne contamination in the area, 4.5 DAC. Previous maintenance records indicate that it takes 1 hour and 30 minutes to perform the job without a respirator and 1 hour and 45 minutes to perform this job with a respirator.

Assigned Task: The USS has directed you to "Calculate expected worker dose and determine whether or not a respirator should be used".

Task Standard: The candidate correctly calculates potential dose for the job to be performed. Recommends the use of a respirator to perform the activity.

Required Items:	00920, Radiation Exposure Limits and Administrative Guidelines 00930, Radiation and Contamination Control
Simulator Setup:	Performance of this JPM does not require the simulator.

START TIME: ___________

STEP 1
CRITICAL ( )
SAT UNSAT
Determine worker dose without respirator
@ (60 mr/hr)(1.5 hrs) = 90 mr
@ 90mr + (2.5 mr/hr-DAC)(4.5 DAC)(1.5hr) = 106.875mr

STEP 2
CRITICAL ( )
SAT UNSAT
Determine worker dose with respirator
@ (60 mr/hr)(1.75 hr) = 105 mr

STEP 3
CRITICAL ( )
SAT UNSAT
Determines that performing the job with a respirator results in a lower dose. Recommends the use of a respirator
Note: If a discrepency exist in the values of this JPM and the values calculated by the examinee, all work performed by the examinee should be collected and evaluated to determine where error exist. If the error is determined to be a math or interpolation error and the error does not affect the acceptance criteria, then the JPM should be considered as satisfactory. If the error is due to improper usage or a lack of knowledge, then the JPM should be considered unsatisfactory.

STOP TIME: _______________

Field Notes

PLANT VOGTLE

CONTROL ROOM OPERATOR

JOB PERFORMANCE MEASURE

Implement Offsite Protective Action Recommendations

Directions to Operator

This information describes the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the task before beginning. You will be allowed access to any item normally used to perform this task.

Initial Conditions: An RCS leak has occurred. Charging has been maximized, however pressurizer level continues to decrease. Radiation monitors RE-005 and RE-006 are reading approximately 3.5 E8 mr/hr. Containment hydrogen concentration is 7%. Dose Assessment and Core Damage Assesment have been initiated but will not be completed for approximately 30 minutes. Wind direction is currently 330°.

Assigned Task: Based on the information given, determine the required Offsite Protective Action Recommendation(s).

OPERATOR'S NAME: ______________________________

EVALUATION DATE: ___/___/___

JPM TITLE: Implement Offsite Protective Action Recommendations

COMPLETION TIME: 8 minutes

Application: **SRO Only**

K/A Number: 194001A1.16 SRO: 4.4
10CFR55.45 Ref.: 11

Evaluation Method [ ] Performed [ ] Simulated

Evaluation Location [ ] Simulator [ ] Control Room [ ] Unit 1 [ ] Unit 2

Performance Time: _____minutes

OVERALL JPM EVALUATION

[ ] SATISFACTORY [ ] UNSATISFACTORY

Examiner Comments:

Examiner's Signature: ______________________________

Required Items: Procedure 91305-C, Protective Action Guidelines

Simulator Setup: Simulator not required for JPM performance

Examiner's Copy

You will be given information describing the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the assigned task before beginning. You will be allowed access to any item normally used to perform this task.

Initial Conditions: An RCS leak has occurred. Charging has been maximized however pressurizer level continues to decrease. Radiation monitors RE-005 and RE-006 are reading approximately 3.5 E8 mr/hr. Containment hydrogen concentration is 7%. Dose Assessment and Core Damage Assesment have been initiated but will not be completed for approximately 30 minutes. Wind direction is currently 330°.

Assigned Task: Based on the information given, determine the required Offsite Protective Action Recommendation(s).

Task Standard: Offsite Protective Action Recommendation(s) correctly identified.

START TIME: ___________

STEP 1
CRITICAL ( )
SAT UNSAT
Determine correct Protective Action Recommendations
Note: *Initial Emergency Classification is a seperate JPM therefore classification is not required and provided in the individual scenarios. In addition, notification forms are not required to be completed for performance of this JPM.*
PAR 2:
@ Evacuate Zones A,B-5,C-5, D-5, E-5, F-5, B-10, C-10, D-10.
@ Evacuate SRS to 5 miles.
@ Shelter remainder of 10 mile EPZ

STOP TIME: ___________

Field Notes

Facility: VOGTLE Date of Examination: ______
Examination Level (circle one): **RO** /SRO Operating Test Number: ______

Administrative Topic/Subject Description		Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions
A.1	Conduct of Operations	Perform a Shutdown Margin Calculation in Mode 3
	Conduct of Operations	Evaluate Overtime Guidelines
A.2	Equipment Control	Clearance Review and Verification
A.3	Radiation Control	Calculate expected personnel exposure with and without use of a respirator for maintenance activity in high radiation airborne contamination area
A.4	Emergency Plan	Complete ENN Form within allowable Time Site Area Emergency

PLANT VOGTLE

CONTROL ROOM OPERATOR

JOB PERFORMANCE MEASURE

**Make Emergency Notifications
with Failure of the ENN**

Directions to Operator

This information describes the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the task before beginning. You will be allowed access to any item normally used to perform this task.

o ***This is a Time Critical JPM*** o

Initial Conditions: An Site Area Emergency has been declared and the Shift Superintendent has assumed the duties of the Emergency Director.

Assigned Task: The Emergency Director has directed you to "Perform the duties of the ENN Communicator".

OPERATOR'S NAME: ______________________________

EVALUATION DATE: ___/___/___

JPM TITLE: Make Emergency Notifications with Failure of the ENN

COMPLETION TIME: **15 minutes** **TIME CRITICAL**

Application: **RO**

K/A Number: 194001A1.16 RO: 3.1
10CFR55.45 Ref.: 11

Evaluation Method [ ] Performed [ ] Simulated

Evaluation Location [ ] Simulator [ ] Control Room

Performance Time: _____minutes

OVERALL JPM EVALUATION

[ ] SATISFACTORY **[ ] UNSATISFACTORY**

Examiner Comments:

Examiner's Signature: ______________________________

Required Items:	Procedure 91002-C, Emergency Notifications, Checklist 2 VEGP Emergency Response Telephone Directory
Simulator Setup:	Simulator not required for JPM performance
Notes to Examiner:	*Checklist 2, Sheet 2, Emergency Notification, should be completed with the exception of Steps 3, 4, and 6 prior to the start of this JPM. Step 1.A, THIS IS A DRILL, should always be recorded.* *Step 3 of the Emergency Notification form must be completed within 15 minutes of the time documented in Step 6.A. The start time of this JPM should be the time recorded in Step 6.A.* ***Ensure the ENN telephone jack in the rear of the ENN telephone has the "Simulator" cord installed.***

Examiner's Copy

You will be given information describing the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the assigned task before beginning. You will be allowed access to any item normally used to perform this task.

This is a Time Critical JPM

Initial Conditions:	An Site Area Emergency has been declared and the Shift Superintendent has assumed the duties of the Emergency Director.
Assigned Task:	The Emergency Director has directed you to "Perform the duties of the ENN Communicator".
Task Standard:	Communications established and the Emergency Notification forms transmitted to all State and Local authorities.

START TIME: __________ **TIME CRITICAL**

STEP 1
CRITICAL ( )
SAT UNSAT
Attempt autodial of state and local agencies.
@ Press ** to ring all agencies.

STEP 2
SAT UNSAT
Initiate roll call
*Note: The Emergency Response Telephone Directory, or the dial code card, should be consulted as needed for required ENN dial codes. The dial code, **, should be used initially to ring ALL required agencies.*
@ Burke County notified *(1)*
@ GEMA notified **(2)**
@ Aiken County notified
@ SRS notifed
@ Allendale County notified
@ State of South Carolina notified
@ Barnwell County
CUES:

(1) When requested, provide cue that each emergency center hailed has responded.
(2) Do not respond when GEMA is hailed.

STEP 3
CRITICAL ( )
SAT UNSAT
Notify GEMA
Note: For initial notifications the candidate should use the ENN phone and dial the individual station

code listed on the ENN phone pullout card. (Color-coded yellow)

@	Use ENN to contact GEMA Communications - Dial Code 90
@	GEMA directed to respond to ENN

STEP 4

SAT UNSAT

Transmit facsimile

Note: On the Fax machine in the Simulator, the pushbutton labelled "Simulator Training" should be depressed to simulate "NOTIFY", if necessary a cue to the examinee should be provided that for simulation purposes, the "Simulator Training" pushbutton should be used to trnasmit the fax.

@	Place message face dow in transmit tray
@	Ensure Fax in AUTO REC mode
@	Ensure Single Button Dial selected
@	NOTIFY pushbutton depressed

STEP 5

SAT UNSAT

Initiate second roll call

*Note: The Emergency Response Telephone Directory, or the dial code card, should be consulted as needed for required ENN dial codes. The dial code, **, should be used initially to ring ALL required agencies.*

@	Burke County notified *(1)*
@	GEMA notified
@	Aiken County notified
@	SRS notifed
@	Allendale County notified
@	State of South Carolina notified
@	Barnwell County

CUES:

(1) When requested, provide cue that each emergency center hailed has responded.

STEP 6
SAT UNSAT
Communicate notification via ENN
Note: Examiner should arbitrarily pick a number between 1 and 130 and verify that the authentication codeword is correctly identified by examinee.
@ Lines 1 & 2 transmitted
@ Examinee's name provided in Line 2, "Reported By"
@ Line 3, Transmittal time & date completed *(1)*
@ Control Room confirmation phone number transmitted
CUES:

(1) After completion of Emergency Notification form line 3, provide the following cue, "The State of South Carolina request that you authenticate number ___."

STOP TIME: __________

STEP 7
CRITICAL ( )
SAT UNSAT
Message authentication
Note: The authentication codes are located in the Emergency Response Telephone Directory. The codeword provided should match the number given in the cue of JPM Step 6.
@ Authentication codeword correctly provided.

STEP 8
CRITICAL ( )
SAT UNSAT
Transmit classification data

@ Emergency Classification
@ Emergency declaration time and date
@ Emergency description

STEP 9
CRITICAL ( )
SAT UNSAT
Transmit current plant radiological conditions
@ Plant condition
@ Emergency rad release status
@ Current meteorological data
@ Recommended protective actions
@ ED approval,time, & date

STEP 10
SAT UNSAT
Notify Emergency Director
@ Initial notification of State and Local agencies complete

STEP 8
SAT UNSAT
Notify ED
@ Initial Emergency Notification completed

Field Notes:

Sheet 3 of 7

CHECKLIST 2 (EXAMPLE)
EMERGENCY NOTIFICATION

1. [X] THIS IS A DRILL [B] ACTUAL EMERGENCY [X] INITIAL [ ] FOLLOW-UP MESSAGE NUMBER 1

2. SITE VOGTLE UNIT: ONE REPORTED BY: ______ (Name)

3. COMMUNICATOR TRANSMITTAL/TIME/DATE: ______ (Eastern) / ___ (mm) / ___ (dd) / ___ (yy)

CONFIRMATION PHONE NUMBER: CHECK BOX

[ ]	CONTROL ROOM	1-706-554-6762
[ ]	TSC	1-706-826-3508
[ ]	EOF	1-706-826-4367

4. AUTHENTICATION (If Required): ______ (Number) ______ (Codeword)

5. EMERGENCY CLASSIFICATION:
[A] NOTIFICATION OF UNUSUAL EVENT [B] ALERT [X] SITE AREA EMERGENCY [D] GENERAL EMERGENCY

6. [X] Emergency Declaration At: [B] Termination At: TIME/DATE: ______ (Eastern) / ___ (mm) / ___ (dd) / ___ (yy) (If B, go to Item 16.)

7. EMERGENCY DESCRIPTION/REMARKS: STEAM GENERATOR TUBE RUPTURE WITH PROLONGED RELEASE TO THE ENVIRONMENT

8. PLANT CONDITION: [A] IMPROVING [X] STABLE [C] DEGRADING

9. REACTOR STATUS: [X] SHUTDOWN: TIME/DATE: ______ (Eastern) / ___ (mm) / ___ (dd) / ___ (yy) [B] ____ % POWER

10. EMERGENCY RELEASE(S):
[A] NONE (Go to item 14.) [B] POTENTIAL (Go to item 14.) [X] IS OCCURRING [D] HAS OCCURRED

**11. TYPE OF RELEASE: [ ] ELEVATED [X] GROUND LEVEL

[A] AIRBORNE: Started ______ Time (Eastern) / ______ Date Stopped ______ Time (Eastern) / ______ Date

[B] LIQUID: Started ______ Time (Eastern) / ______ Date Stopped: ______ Time (Eastern) / ______ Date

**12. RELEASE MAGNITUDE: [ ] CURIES PER SEC. [ ] CURIES NORMAL OPERATING LIMITS: [ ] BELOW [ ] ABOVE

[A] NOBLE GASES ______ [B] IODINES ______
[C] PARTICULATES ______ [D] OTHER ______

**13. ESTIMATE OF PROJECTED OFFSITE DOSE: [ ] NEW [ ] UNCHANGED PROJECTION TIME ______ (Eastern)

ESTIMATED DURATION ____ HRS.

	TEDE mrem	Thyroid CDE mrem
SITE BOUNDARY		
2 MILES		
5 MILES		
10 MILES		

14. METEOROLOGICAL DATA: [X] WIND DIRECTION (From) 230 ° [X] SPEED (mph) 3
[X] STABILITY CLASS D ** [X] PRECIPITATION (type) NONE

15. RECOMMENDED PROTECTIVE ACTIONS:
[X] NO RECOMMENDED PROTECTIVE ACTIONS
[ ] EVACUATE ______
[ ] SHELTER-IN-PLACE ______
[ ] OTHER ______

16. APPROVED BY: JOHN DOE (Name) EMERGENCY DIRECTOR (Title) TIME/DATE: ______ (Eastern) / ___ (mm) / ___ (dd) / ___ (yy)

*If items 8-14 have not changed, only items 1-7 and 15-16 are required to be completed.
**Information may not be available on initial notifications.
Form No. 9-2317 (1/13/97)

Abnormal Operating Procedures

LOSS OF NUCLEAR SERVICE COOLING WATER SYSTEM

EFFECTIVE UPON ITS IMPLEMENTATION

PRB REVIEW REQUIRED

PURPOSE

This procedure addresses the loss or degraded operation of one or more trains of Nuclear Service Cooling Water (NSCW).

SYMPTOMS

- Trip of operating NSCW pumps and failure of standby pump to start.
- Dropping NSCW Supply Header pressure.
- Large difference between Supply Header flow and Return Header flow, indicating a large leak.
- NSCW Tower Basin temperature rising above 90°F.
- High temperature or low flow alarms on any components or systems cooled by NSCW.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. Verify only 2 NSCW pumps running in the affected train.	1. a. IF no pumps or only one pump can be placed in service, THEN: 1) Place all pump handswitches in the affected train in PULL-TO-LOCK. 2) Shut down the train-related Emergency Diesel Generator or disable automatic operation by initiating 13145, DIESEL GENERATORS. 3) Investigate cause for trip of running pump(s). 4) Refer to Tech. Spec. LCO 3.8.1 or LCO 3.8.2 as applicable. b. IF three pumps are running, and the low header pressure annunciator is clear, THEN trip one pump and go to Step 2. c. IF three pumps are running due to a leak in the system, THEN verify proper operation of unaffected NSCW train and go to Step 4. d. IF power is not available per status light indication, THEN initiate 18031-C, LOSS OF CLASS 1E ELECTRICAL SYSTEMS.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. Check affected NSCW train operation:	
a. Verify the following: • Supply header pressure - GREATER THAN 70 PSIG. Train A: PI-1636 Train B: PI-1637 • Supply header temperature computer indication - LESS THAN 90°F. Train A: TE-1642 Train B: TE-1643 • Supply header flow - APPROXIMATELY 17,000 GPM. Train A: FI-1640B Train B: FI-1641B • Return header flow - APPROXIMATELY 17,000 GPM. Train A: FI-1640A Train B: FI-1641A	a. Ensure the opposite NSCW train in operation by initiating 13150, NUCLEAR SERVICE COOLING WATER SYSTEM. -OR- <u>IF</u> neither NSCW train can be placed in normal, two pump operation, <u>THEN</u>: • Trip the reactor and go to 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION. • Trip all reactor coolant pumps. • Isolate letdown • Attempt to place one train of NSCW in single pump operation by initiating 13150, NUCLEAR SERVICE COOLING WATER SYSTEM. <u>WHEN</u> single pump NSCW operation has been established, <u>THEN</u> verify RCP No. 1 seal temperatures less than 220°F, and ensure the train-related CCP is running and seal injection flow established per 13006, CHEMICAL AND VOLUME CONTROL SYSTEM.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
(Step 2 continued from previous page)	
	IF RCP No. 1 seal temperature greater than 220°F, THEN refer to ATTACHMENT B to recover seal injection.
b. Check NSCW cooling tower basin levels - GREATER THAN 73%. Train A: LI-1606 Train B: LI-1607	b. Stop cooling tower blowdown. Makeup to cooling towers by initiating 13150, NUCLEAR SERVICE COOLING WATER SYSTEM. -OR- Comply with Tech. Spec. LCO 3.7.9.
c. Verify proper operation of affected NSCW train.	c. Go to Step 4.
3. Go to Step 11.	
4. Start or verify in automatic, as required, the following components in the unaffected train: • CCP • SIP • CS Pump • RHR Pump • CCW Pumps • CREFs • ESF Chiller	4. Initiate the following as appropriate: • 18020-C, LOSS OF COMPONENT COOLING WATER • 18022-C, LOSS OF AUXILIARY COMPONENT COOLING WATER • 18019-C, LOSS OF RESIDUAL HEAT REMOVAL

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. Place the affected train components in PULL-TO-LOCK: • CCP • SIP • CS Pump • RHR Pump • CCW Pumps • CREFs • ESF Chiller (STOP position)	
6. Isolate and repair any leaks on affected NSCW train. a. IF significant leakage from the affected train is indicated, THEN shut down affected train by placing all three NSCW pump handswitches in PULL-TO-LOCK. b. Dispatch operator(s) to locate and isolate the leak. c. Initiate maintenance as required.	6. IF leak cannot be repaired within 72 hours, THEN comply with Tech. Spec. LCO 3.7.8 or LCO 3.7.9 by initiating applicable UOPs.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. Perform the following (see ATTACHMENT A for handswitch listing): a. Start fans in unaffected train: • CTB Coolers in high speed • CTB Aux Air Cooler • Reactor Cavity Cooler b. Place fans in affected train in PULL-TO-LOCK or STOP as required: • CTB Coolers high speed • CTB Coolers low speed • CTB Aux Air Cooler • Reactor Cavity Cooler	
8. <u>IF</u> either diesel generator cannot be operated due to the loss of NSCW, <u>THEN</u> place it in maintenance mode by initiating 13145, DIESEL GENERATORS.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. Check Tech. Specs. for operability requirements of components served by the affected NSCW train to determine the most limiting Tech. Spec. time constraint on continued operation in the present mode. • ECCS • DGs • RHR • CS • CNMT Coolers • CCW • ESF Chiller and room coolers • CREFs • UHS	
10. Restore the NSCW train to operation within 72 hours.	10. Comply with Tech. Spec. LCO 3.7.8 or LCO 3.7.9.
11. Check NSCW return temperature of affected train less than 95°F read on TI-1676A (Train A) or TI-1677A (Train B).	11. Start any fans that are not running. -OR- Shift operating auxiliary systems to the unaffected NSCW train as necessary.
12. Continue operation by returning to applicable UOP.	

END OF SUB-PROCEDURE TEXT

Sheet 1 of 2

ATTACHMENT A

CONTAINMENT VENTILATION EQUIPMENT LIST

EQUIPMENT NAME	OHVC LOCATION	EQUIPMENT NUMBER	HANDSWITCH
TRAIN A			
CTB CLG UNIT FAN-1 LOW SPEED	CNMT HEAT REMOVAL ESF	1501-A7-001	HS-12582A
CTB CLG UNIT FAN-1 HIGH SPEED	CNMT HEAT REMOVAL ESF	1501-A7-001	HS-12582D
CTB CLG UNIT FAN-2 LOW SPEED	CNMT HEAT REMOVAL ESF	1501-A7-002	HS-2582A
CTB CLG UNIT FAN-2 HIGH SPEED	CNMT HEAT REMOVAL ESF	1501-A7-002	HS-2582D
CTB CLG UNIT FAN-5 LOW SPEED	CNMT HEAT REMOVAL ESF	1501-A7-005	HS-12584A
CTB CLG UNIT FAN-5 HIGH SPEED	CNMT HEAT REMOVAL ESF	1501-A7-005	HS-12584D
CTB CLG UNIT FAN-6 LOW SPEED	CNMT HEAT REMOVAL ESF	1501-A7-006	HS-2584A
CTB CLG UNIT FAN-6 HIGH SPEED	CNMT HEAT REMOVAL ESF	1501-A7-006	HS-2584D
CTB AUX CLG UNIT CIRC FAN-1	CNMT HEAT REMOVAL ESF	1515-A7-001	HS-12255
REACTOR CAVITY COOLING FAN-1	CNMT CRDM CAV & REACTOR SUPPORT	1511-B7-001	HS-2650

Sheet 2 of 2

ATTACHMENT A

CONTAINMENT VENTILATION EQUIPMENT LIST

EQUIPMENT NAME	OHVC LOCATION	EQUIPMENT NUMBER	HANDSWITCH
TRAIN B			
CTB CLG UNIT FAN-3 LOW SPEED	CNMT HEAT REMOVAL ESF	1501-A7-003	HS-12583A
CTB CLG UNIT FAN-3 HIGH SPEED	CNMT HEAT REMOVAL ESF	1501-A7-003	HS-12583D
CTB CLG UNIT FAN-4 LOW SPEED	CNMT HEAT REMOVAL ESF	1501-A7-004	HS-2583A
CTB CLG UNIT FAN-4 HIGH SPEED	CNMT HEAT REMOVAL ESF	1501-A7-004	HS-2583D
CTB CLG UNIT FAN-7 LOW SPEED	CNMT HEAT REMOVAL ESF	1501-A7-007	HS-12585A
CTB CLG UNIT FAN-7 HIGH SPEED	CNMT HEAT REMOVAL ESF	1501-A7-007	HS-12585D
CTB CLG UNIT FAN-8 LOW SPEED	CNMT HEAT REMOVAL ESF	1501-A7-008	HS-2585A
CTB CLG UNIT FAN-8 HIGH SPEED	CNMT HEAT REMOVAL ESF	1501-A7-008	HS-2585D
CTB AUX CLG UNIT CIRC FAN-2	CNMT HEAT REMOVAL ESF	1515-A7-002	HS-12257
REACTOR CAVITY COOLING FAN-2	CNMT CRDM CAV & REACTOR SUPPORT	1511-B7-002	HS-2651

END OF ATTACHMENT A

ATTACHMENT B

RECOVERY OF RCP SEAL INJECTION

1. Dispatch operator to shut CVCS SEALS RCP SEAL INJ NEEDLE VLVS TO #1 SEAL for affected RCP: (Valves are locked and require an adjustable wrench for operation.)

   UNIT 1

   - 1-1208-U4-414 (RCP 1) (AB-A09)
   - 1-1208-U4-415 (RCP 2) (AB-A09)
   - 1-1208-U4-416 (RCP 3) (FHB-A10)
   - 1-1208-U4-417 (RCP 4) (FHB-A10)

   UNIT 2

   - 2-1208-U4-414 (RCP 1) (AB-A103)
   - 2-1208-U4-415 (RCP 2) (AB-A103)
   - 2-1208-U4-416 (RCP 3) (FHB-A01)
   - 2-1208-U4-417 (RCP 4) (FHB-A01)

2. Verify CVCS SEALS RCP SEAL INJ NEEDLE VLVS of Step 1 of this Attachment are shut.

   WHEN valves shut,
   THEN go to Step 3.

3. Start the available charging pump per 13006 CHEMICAL AND VOLUME CONTROL SYSTEM.

   NOTE: Establish communications between control room and local operator prior to performing Step 4.

4. Slowly open CVCS SEALS RCP SEAL INJ NEEDLE VLVS TO #1 SEAL to establish a 1°F per minute cooldown rate.

5. Control charging and seal injection using FV-0121 and HV-0182.

Sheet 2 of 2

ATTACHMENT B (Cont'd)

RECOVERY OF RCP SEAL INJECTION

6. Verify RCP seal parameters:

- RCP seal injection temperature (PLANT COMPUTER - RCP STATUS) - LESS THAN 135°F:

RCP #	PLANT COMPUTER PT
1	T0417
2	T0437
3	T0457
4	T0477

- RCP Number 1 seal temperature (PLANT COMPUTER - RCP STATUS) - LESS THAN 220°F:

RCP #	PLANT COMPUTER PT
1	T0181
2	T0182
3	T0183
4	T0184

- ACCW supply temperature (PLANT COMPUTER - ACCW) - LESS THAN 105°F.

7. Return to Step 2b of this procedure.

END OF ATTACHMENT B

Facility: ____Vogtle__________________ Date of Examination: ______________
Exam Level (circle one): RO / SRO(I) / **SRO(U)** Operating Test No.: _______

B.1 Control Room Systems

	System / JPM Title	Type Code*	Safety Function
a.	**CRD/Dropped Rod Recovery. Use existing JPM RQ-JP-60303-002-01. At Step A15 of 18003-C, "Rod Control System Malfunction", after rod has been withdrawn approximately 20 steps, drop a rod in another bank.**	**Alternate Path New**	**I**
b.	**Transfer ECCS Pumps to Cold Leg Recirculation**	**Direct**	**II**
c.	**RQ-JP-11205-002-01a Perform Monthly DG Surveillance Test (December) Diesel generator reactive load fails negative requiring operator action.**	**Modified/ Alternate Path**	**VI**
d.	RCP/Start a Reactor Coolant Pump Begin with seal parameters outside of acceptable region of 12001, Fig. 1. Candidate must correct conditions prior to start of 1st RCP.	Modified/ Alternate Path	IV(P)
e.	NIS/Perform Power Range Calorimetric Channel Calibration	Direct	VIII
f.	RQ-JP-60317-001-01 NSCW/Respond to Loss of NSCW	Direct Control Room	VII
g.	LO-JP-29130-002-01 Reduce Containment Pressure Following CVI	Direct Control Room	V

B.2 Facility Walk-Through

DISTRIBUTION CODE
A070

a. **PZR PC/Depressurize RCS Following SGTR (Steamline isolated and PORV sticks open)**	**Alternate Path New**	**III**
b. RQ-JP-47411-001-01 Manually Isolate a Liquid Waste Release	Direct	IX
c. **RQ-JP-20201-006-01** **AFW/Reset Of The TDAFW Trip and Throttle Valve**	**Direct**	**IV(S)**
* 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		

PLANT VOGTLE

CONTROL ROOM OPERATOR

JOB PERFORMANCE MEASURE

Realign Dropped Rod to Affected Group

Directions to Operator

This information describes the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the task before beginning. You will be allowed access to any item normally used to perform this task.

Initial Conditions: While withdrawing rods during a power increase, the operators observed that Control Bank D rod D4 dropped into the core. The crew has completed steps A1 thru A9 of 18003. After 35 minutes, I&C has replaced a blown lift coil fuse. The DRPI rod position was recorded at 209 steps on CBD.

Assigned Task: The USS directs you to perform 18003 "Rod Control System Malfunction" Realign rod D4 beginning with step A10 of 18003".

OPERATOR'S NAME: ______________________________

EVALUATION DATE: ___/___/___

JPM TITLE: Realign Dropped Rod to Affected Group

COMPLETION TIME: 13 minutes

Application: **RO/SRO**
K/A Number: 001000A203 RO: 3.5 SRO: 4.2
10CFR55.45 Ref.: 6, 12,

Evaluation Method [ ] Performed [ ] Simulated

Evaluation Location [ ] Simulator [ ] Control Room [ ] Unit 1 [ ] Unit 2

Performance Time: _____minutes

OVERALL JPM EVALUATION

[ ] SATISFACTORY [ ] UNSATISFACTORY

Examiner Comments:

Examiner's Signature: ______________________________

Required Items: 18003, Rod Control System Malfunction

Simulator Setup:

Reset to IC15
Ensure rods in manual and step counters set at 209 on CBD)
Insert malfunction RD13H (Dropped Rod - D4)
Withdraw CBD to 209 steps
Verify Rod Deviation alarm is illuminated
Adjust turbine load as necessary to restore Tavg
Remove malfunction RD13H
Ack/Reset alarms
Set trigger for malfunctions RD13A and RD13J at 36 steps on CBD
Freeze simulator

Setup time: 10 minutes

Examiner's Copy

You will be given information describing the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the assigned task before beginning. You will be allowed access to any item normally used to perform this task.

Initial Conditions:	While withdrawing rods during a power increase, the operators observed Control Bank D rod D4 dropped into the core. The crew has completed steps A1 thru A9 of 18003. After 35 minutes, I&C has replaced a blown lift coil fuse. The DRPI rod position was recorded at 209 steps on CBD.
Assigned Task:	The USS directs you to perform 18003 to realign rod D4 beginning with step A10 of 18003".
Task Standard:	Responds to plant conditions to realign misaligned rod to its associated group's rod height.

START TIME: __________

STEP 1
SAT UNSAT
Verify Rod control Urgent Failure alarm clears
@ Acknowledges "Rod Control Urgent Failure Alarm"

STEP 2
CRITICAL ( )
SAT UNSAT
Select affected bank for control
@ Rod Control HS-40041 in CBD

STEP 3
SAT UNSAT
Reset the CBD step counter to zero
@ CBD step counter set to zero

STEP 4
CRITICAL ( )
SAT UNSAT
Disconnect lift coils for bank's unaffected rods
@ Rod disconnect switches M12, D12, M4, and H8 in disconnect (up)

STEP 5
SAT UNSAT
Ensure Tavg/Tref are matched during recovery

NOTE: Candidate May have to adjust turbine load to maintain Tavg within +/- 2 degrees of Tref

STEP 6	
CRITICAL ( )	
SAT UNSAT	
Realign the misaligned rod	
@	Rod D4 manually withdrawn
@	Tavg maintained ± 2°F of Tref during realignment **(1)**
@	CBD withdrawn 36 steps
@	Two control rods drop into core

STEP 7	
CRITICAL ( )	
SAT UNSAT	
Recognize/Diagnose two dropped rods in Mode 1	
@	Manually trips reactor. Enters 19000-C, E-0 Reactor Trip or Safety Injection Actuation
@	Performs immediate actions of 19000-C

STEP 8
SAT UNSAT
Report to USS
Reactor trip____________________

STOP TIME: ________________

Field Notes

PLANT VOGTLE

CONTROL ROOM OPERATOR

JOB PERFORMANCE MEASURE

Transfer ECCS Pumps to Cold Leg Recirculation

Directions to Operator

This information describes the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the task before beginning. You will be allowed access to any item normally used to perform this task.

° *This is a Time Critical JPM* °

Initial Conditions: A large break LOCA has occured. While performing 19010, RWST level decreased below 39%. Transition to 19013 is required based on foldout page guidance.

Assigned Task: The USS directs you to transfer the ECCS pumps to cold leg recirculation using procedure 19013.

OPERATOR'S NAME: ______________________________

EVALUATION DATE: ___/___/___

JPM TITLE: Transfer ECCS Pumps to Cold Leg Recirculation

COMPLETION TIME: **14 minutes** **TIME CRITICAL**
Note: This time limit is based on FSAR Table 6.3.2-7 as revised by REA 97-VAA673.

Application: **RO/SRO**

K/A Number: 000011EA111 RO: 4.2 SRO: 4.2

10CFR55.45 Ref.: 4, 6, 7

Evaluation Method [ ] Performed [ ] Simulated

Evaluation Location [ ] Simulator [ ] Control Room [ ] Unit 1 [ ] Unit 2

Performance Time: _____minutes

OVERALL JPM EVALUATION

[ ] SATISFACTORY **[ ] UNSATISFACTORY**

Examiner Comments:

Examiner's Signature: ______________________________

Required Items: 19013, Transfer to Cold Leg Recirculation

Simulator Setup:

Reset to IC14
Insert malfunction RC03 at 100% (DBA LOCA)
Trip all RCPs
Reset SI
When Cnmt Emergency Sump Levels are » 10 inches, set RF: TK02 = 39%
Ensure HV-8811A & 8811B are FULL OPEN
Ack/Reset alarms
Freeze simulator
RF: CV17 may be required if it is desired to place LV-112D/E to local (activate when requested)

Setup time: 15 minutes

Examiners Copy

You will be given information describing the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the assigned task before beginning. You will be allowed access to any item normally used to perform this task.

This is a Time Critical JPM

Initial Conditions: A large break LOCA has occured. While performing 19010, RWST level decreased below 39%. Transition to 19013 is required based on foldout page guidance.

Assigned Task: The USS directs you to transfer the ECCS pumps to cold leg recirculation using procedure 19013.

Task Standard: ECCS pumps operating in the cold leg recirculation mode.

START TIME: __________ **TIME CRITICAL**

STEP 1 (1)
SAT UNSAT
Reset SI
@ SI reset
@ BPLP window 1:5 lit (Auto SI blocked)
@ BPLP window 1:4 dark (SI actuated)

STEP 2 (2)
SAT UNSAT
Verify CCW to RHR heat exchangers
@ TWO CCW pumps in each train running
@ CCW pump discharge pressures and flows above red indicator line
@ TWO NSCW pumps in each train running
@ FOUR NSCW fans in each train in auto

Step 3 (3 & 4)
CRITICAL
SAT UNSAT
Verify flow path for RHR pumps
@ Emergency sump level >13.5 inches on control board indicators LI-764 and LI-765.
@ RHR pumps A and B - RUNNING
@ RHR to cold leg isolation valves HV-8809A and HV-8809B OPEN
@ RHR heat exchanger A and B flow GREATER THAN 500 GPM

STEP 4 (5)
CRITICAL ( )
SAT UNSAT
Enable Lock Out Valves
Note: If examinee request, provide cue that the CBO has been dispatched to the shutdown panels.
@ Safety Injection Pump lockout switches HS-8806A and HS-8813A in ON

STEP 5
CRITICAL ( )
SAT UNSAT
Align RHR Pump A and B suction
@ RHR sump suction HV-8811A OPEN
@ RHR RWST suction HV-8812A CLOSED
@ RHR sump suction HV-8811B OPEN
@ RHR RWST suction HV-8812B CLOSED

STEP 6
CRITICAL ( )
SAT UNSAT
Isolate SIP and CCP miniflows from RWST
Note: If HV8509A/B are not shut, then HV8508A/B must be shut with the white pressure control mode light extinguished.
@ SI pump miniflows HV-8813, HV-8814 and HV-8920 CLOSED
@ CCP alternate miniflows HV-8508A or HV-8509B CLOSED
@ CCP alternate miniflows HV-8508B or HV-8509A CLOSED
@ White Pressure Control Mode light - OUT

STEP 7
SAT UNSAT
Separate RHR trains
@ RHR discharge cross-connects HS-8716A and HS-8716B CLOSED
@ CCP/SIP suction cross-connect HV-8924 OPEN
@ CCP/SIP suction cross-connects HV-8807A and HV-8807B OPEN

STEP 9
CRITICAL
SAT UNSAT
Align RHR discharge to CCP and SIP suction
@ RHR to CCP HV-8804A OPEN
@ RHR to SIP HV-8804B OPEN

STOP TIME: _______________

The remaining actions of the procedure are follow-up actions to ensure correct alignment and are not subject to the time critical requirement of 14 minutes.

STEP 10
Shut RWST to CCP A & B Suction valves:
@ LV-112D - SHUT
@ LV-112E - SHUT
STEP 11
Shut RWST to SI A & B Suction valves:
@ HV-8806 - SHUT

STOP TIME ______

Field Notes

PLANT VOGTLE

CONTROL ROOM OPERATOR

JOB PERFORMANCE MEASURE

Perform Diesel Generator Operability Test

Directions to Operator

This information describes the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the task before beginning. You will be allowed access to any item normally used to perform this task.

Initial Conditions: Surveillance testing of Diesel Generator 1B is to be performed pursuant to surveillance requirement 3.8.1.7.

Assigned Task: The USS directs you to perform the six-month fast start surveillance on DG1B in accordance with procedure 14980.

OPERATOR'S NAME: ________________________________

EVALUATION DATE: ___/___/___

JPM TITLE: Perform Diesel Generator Six-Month Fast Start Operability Test

COMPLETION TIME: 20 minutes

Application: **RO/SRO**

K/A Number: 064000A406 RO: 3.9 SRO: 3.9
10CFR55.45 Ref.: 6, 12,

Evaluation Method [ ] Performed [ ] Simulated

Evaluation Location [ ] Simulator [ ] Control Room [ ] Unit 1 [ ] Unit 2

Performance Time: _____ minutes

OVERALL JPM EVALUATION

[ ] SATISFACTORY **[ ] UNSATISFACTORY**

Examiner Comments:

Examiner's Signature: ___________________________________

Required Items: 14980, Diesel Generator 1B Operability Test - Fast Start
14980 Data Sheet 4; DG 1B Fast Start Surveillance Data

Simulator Setup: Reset to IC14
Set RF: DG19 to FAST START
Sync Mode Selector switch, TS-DGB in MANUAL
Freeze simulator
Complete 14980 Data Sheet 4 initial information and record engine hours.

Note: *A simulator operator will be required to simulate local actions with DG remote functions for the Exciter Permissive switch, DG19 and Exciter Enable pushbutton, DG21.*

Setup time: 3 minutes

Examiners' Copy

You will be given information describing the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the assigned task before beginning. You will be allowed access to any item normally used to perform this task.

Initial Conditions: Surveillance testing of Diesel Generator 1B is to be performed pursuant to surveillance requirement 3.8.1.7.

Assigned Task: The USS directs you to perform the six-month fast start surveillance on DG1B in accordance with procedure 14980.

Task Standard: Operator complies with plant procedures and correctly responds to system conditions while performing Diesel Generator 1B fast start surveillance.

START TIME: ___________

STEP 1
SAT UNSAT
Select procedure
@ Selects14980 Section B5.2 (1)
CUES:
(1) If requested, "This test is being performed to satisfy the six-month and monthly surveillance requirements."
STEP 2
Obtain Stopwatch (1)
CUE:
(1) Stop watch provided by examiner. Other stop watches provided to auxiliary operators at local panel.
STEP 3
Record Engine Hours
Engine hours logged on Data Sheet 4
STEP4
SAT UNSAT
Align voltage regulator

@ Direct operator to position HS-4912 to REGULATOR B
@ Record selected voltage regulator on Data Sheet 4
CUE:
Votage Regulator is in the desired position.
STEP 5
Place DG 1B VM switch to A-B
STEP 6
SAT UNSAT
Align DG for FAST START
Note: Ensure the simulator operator has activated DG19 Exciter Permissive Switch for the fast start.
@ Place Unit/Parallel switch HS-4425 to UNIT position for Fast Start
@ Observe blue UNIT MODE FAST START light ON
@ Direct local operator to place Exciter Permissive switch HS-4914 to NORMAL position (1)
CUES:
(1) Provide cue that Exciter Permissive switch is in the NORMAL position.
STEP 7
Autolog entry for DGB start time (1)
CUE:
Inform candidate that the extra operator will complete the autolog entry.
STEP 8
SAT UNSAT

Open turbo lube oil orifice bypass valve 1-2403-U4-131 (2)

Note: The cue should be given to provide a starting point for the 1 to 2 minute time restraint.

@ 131 opened 1 to 2 minutes

STEP 6

CRITICAL ( )

SAT UNSAT

Start Diesel Generator

@ DGB start pushbutton HS-4570B depressed

STEP 7

CRITICAL ( )

SAT UNSAT

Close turbo lube oil orifice bypass valve

Note: When requested, Provide cue that turbo lube oil orifice bypass valve is closed.

@ Verifies turbo oil pressure guage indication increasing

@ Operator directed to close 1-2403-U4-131

@ Record air start receiver pressure on Data Sheet 4 (1)

CUES:

(1) When requested, "The air start receiver pressure is 200 psig."

STEP 8

CRITICAL ( )

Record operating parameters

@ Verify DG speed ~ 450 RPM (1)

@ Record DG voltage and frequency on Data Sheet 4

@ Reset generator field ground relay (2)

CUES:

(1) Provide cue that engine speed indicates 450 rpm.

(2) Provide cue that field ground relay flag is not visible.

STEP 9

Align sync switches for auto synchronization

@ Sync mode selector TS-DGB in AUTO

@ Breaker BA0319 sync switch ON

STEP 9

Momentarily place the DG 1B UNIT/PARALLEL switch 1=HS-4452B to PARALLEL

Blue UNIT FAST START light OFF

STEP 10

SET 1BA03 voltage to lowest value

Take DGB VM SW thru all positions selecting lowest value

STEP 11

Verify sync scope is operating properly

@ At "6 o'clock", sync scope lights bright

@ At "12 o'clock", Auto sync permissive red light lit

STEP 12

SAT UNSAT

Prepare Diesel Generator for synchronization

@ DG voltage control pushbuttons adjusted to raise DG voltage above bus voltage by ~50 volts

@ DG speed control pushbuttons adjusted until sync scope rotates slowly CW (~ 9 sec rotation)

STEP 14

CRITICAL ( )

SAT UNSAT

Parallel Diesel Generator to the bus

@ Adjust load pot SE-4915(4916) to 1.0 (fully ccw)

@ Auto sync permissive pushbutton PB-DGB depressed and held

@ DG-B output breaker closed

@ 1AA0219(1BA0319)syncswitch OFF

STEP 15

CRITICAL ( )

SAT UNSAT

Load Diesel Generator

@ DG load pot adjusted to attain 6800 to 7000 kW

@ Load increased in ~1000 kW increments (1)

@ Voltage control pushbuttons adjusted to maintain kVARs positive and <1/2 of the kW load (1)

CUES:

(1) During DG loading, Generator reactive load should fail negative and cause the candidate to

manually trip the diesel generator output breaker.
STEP 16
SAT UNSAT
Report to USS/System Engineer
@ DG 1B output breaker tripped manually during surveillance due to voltage fluctuations.

STOP TIME: ______________

Field Notes

PLANT VOGTLE

CONTROL ROOM OPERATOR

JOB PERFORMANCE MEASURE

Start a Reactor Coolant Pump

Directions to Operator

This information describes the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the task before beginning. You will be allowed access to any item normally used to perform this task.

Initial Conditions: A plant startup is in progress with the unit in Mode 4. No RCPs are running. Procedure 13003-1 has been completed through Step 4.1.2.5. The standby alignment has been verified for RCP 4 and an operator has performed a visual inspection.

Assigned Task: The USS directs you to start RCP #4 on Unit 1in accordance with 13003-1 beginning with Step 4.1.2.6.

OPERATOR'S NAME: ______________________________

EVALUATION DATE: ___/___/___

JPM TITLE: Start a Reactor Coolant Pump

COMPLETION TIME: 15 minutes

Application: **RO/SRO**

K/A Number: 003000SG13 RO: 3.6 SRO: 3.7
10CFR55.45 Ref.: 3, 4, 6, 7, 12

Evaluation Method [ ] Performed [ ] Simulated

Evaluation Location [ ] Simulator [ ] Control Room [ ] Unit 1 [ ] Unit 2

Performance Time: ______minutes

OVERALL JPM EVALUATION

[ ] SATISFACTORY **[ ] UNSATISFACTORY**

Examiner Comments:

Examiner's Signature: ______________________________

Required Items: 13003, Reactor Coolant Pump Operation

Simulator Setup: Reset to IC??
Open both breakers for RCP 4. (Do not start lift pump)
Establish stable plant conditions.
Ack/Reset alarms
Freeze simulator

Setup time: 4 minutes

Examiner's Copy

You will be given information describing the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the assigned task before beginning. You will be allowed access to any item normally used to perform this task.

Initial Conditions: A plant startup is in progress with the unit in Mode 4. No RCPs are running. Procedure 13003-1 has been completed through Step 4.1.2.5. The standby alignment has been verified for RCP 4 and an operator has performed a visual inspection.

Assigned Task: The USS directs you to start RCP 4 on Unit 1 in accordance with Procedure 13003-1 beginning at step 4.1.2.6".

Task Standard: Reactor Coolant Pump operating parameters verified and RCP #4 started.

START TIME: __________

STEP 1
SAT UNSAT
Start the oil lift pump
@ RCP 4 oil lift pump running
@ Oil permissive light lit

STEP 2
SAT UNSAT
Establish required RCP starting conditions
@ RCS pressure and temperature within acceptable region of 12001, Fig 1.**(1)**
@ Seal injection flow 8 to 13 gpm **(2)**
@ Seal leakoff flow determined to be w/in normal operating range
@ Seal DP > 200 psid
@ VCT pressure > 15 psig
@ The following annunciators windows DARK:
RCP STANDPIPE HI & LO LEVEL alarms (ALB08)
RCP UPPER & LOWER OIL RSVR HI/LO LEVEL alarms (ALB11)
ACCW CLR LO FLOW,CLR OUTLET HI TEMP,& THERM BARRIER HI FLOW alarms (ALB04)
CUES:
(1) When requested: "No maintenance was performed on the RCP. Visual inspection is complete and the RCP is ready for start".
(2) Seal injection flow will be outside of acceptable range for starting an RCP. Candidate must adjust seal injection flow prior to RCP start.

STEP 3
SAT UNSAT
Verify vibration alarms clear
@ The following annunciators dark:
RCP Frame and Shaft Vibration Alert (ALB08)
RCP Frame and Shaft Hi Vibration (ALB08)

STEP 4
SAT
Establish a decreasing RCS temperature trend
@ Increase RHR heat exchanger flow

STEP 5
SAT UNSAT
Establish a decreasing pressurizer level trend
@ Decrease charging flow.

STEP 6

CRITICAL ( )

SAT UNSAT

Start the RCP

@ Precautions reviewed ***(1) (2)***

@ Oil lift pump running > 2 minutes

@ RCP 4 running

CUE:

(1) If requested, secondary water temperature < 10 degrees above RCS loop temperature.

STEP 6

SAT UNSAT

Stop RCP oil lift pump

@ RCP 4 running > 1 minute

@ RCP 4 oil lift pump stopped

STEP 7

SAT UNSAT

Verify proper RCP operation

Note: Due to low temperatures, RCS loop flows will indicate greater than 100%.

@ The following parameters observed:

RCS loop flow normal

RCP vibration alarms dark

RCP seal injection flows 8 to 13 gpm

RCP seal leakoff flows determined to be w/in normal operating range

RCP seal DP > 200 psid

STEP 8
SAT UNSAT
Report to USS
@ RCP 4 is started and operating normally

STOP TIME: ______________

Field Notes

PLANT VOGTLE

CONTROL ROOM OPERATOR

JOB PERFORMANCE MEASURE

Perform Power Range Calorimetric Channel Calibration

DIRECTIONS TO OPERATOR

You will be given information describing the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the assigned task before beginning. You will be allowed access to any item normally used to perform this task.

Initial Conditions: The plant has been stabilized at 100% power for 1 hour. No other NIS testing is in progress.

Assigned Task: The USS has directed you to "Perform a Plant Computer Calorimetric and adjust the power range channels as required".

EXAMINERS COPY

This information describes the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the task before beginning. You will be allowed access to any item normally used to perform this task.

Initial Conditions: The plant has been stabilized at 100% power for 1 hour. No other NIS testing is in progress.

Assigned Task: The USS has directed you to "Perform a Plant Computer Calorimetric and adjust the power range channels as required".

Task Standard: Power range calorimetric performed and channels adjusted.

OPERATOR'S NAME: ______________________________

EVALUATION DATE: ___/___/___

JPM TITLE: Perform Manual Power Range Calorimetric and Channel Calibration

COMPLETION TIME: 10 minutes

Application: **RO/SRO**

K/A Number: 015000A101 RO: 3.5 SRO: 3.8
REF: 10CFR55.45.4

Evaluation Method [ ] Performed [ ] Simulated

Evaluation Location [ ] Simulator [ ] Control Room [ ] Unit 1 [ ] Unit 2

Performance Time: ______minutes

OVERALL JPM EVALUATION

[ ] SATISFACTORY [ ] UNSATISFACTORY

Examiner Comments:

Examiner's Signature: ________________________________

Required Items: 14030, Power Range Calorimetric Channel Calibration
Calculator

Simulator Setup: Reset to IC14
Isolate normal letdown
Reduce charging flow to minimum
Place XLTDN in service
SLOWLY adjust one PR channel GAIN pot to ~ 95% indication
Adjust the unaffected power ranges to attain 100.0%
Ack/Reset alarms
Freeze simulator

Setup time: 10 minutes

START TIME: ___________

STEP 1
SAT UNSAT
Complete plant computer calorimetric in accordance with ATTACHMENT 1.
STEP 2
SAT UNSAT
Bypass the affected power range channel
Note: Using Data Sheet 3, the operator will once again record power range indications and transfer data from Data Sheet 2.
@ Data Sheet 3 selected

@ Comparator Channel Defeat to selected channel
@ Detector Upper Section Defeat switch to selected channel
@ Detector Lower Section Defeat switch to selected channel
@ Rod Stop Bypass switch to selected channel
@ Power Mismatch Bypass switch to selected channel

STEP 3
CRITICAL ( )
SAT UNSAT
Adjust the affected channel's indication
@ Affected channel's fine gain potentiometer adjusted to attain 98% to 102%
@ Gain potentiometer setting recorded on Data Sheet 3
@ N41 thru N44 Drawer A indications recorded on Data Sheet 3

STEP 4
CRITICAL ( )
SAT UNSAT
Return the affected channel to service
@ Rod Stop Bypass switch to OPERATE
@ Power Mismatch Bypass switch to OPERATE
@ Detector Upper Section Defeat switch to NORMAL
@ Detector Lower Section Defeat switch to NORMAL
@ Comparator Channel Defeat switch to NORMAL
@ Independent verification requested for each switch **(1)**
@ NIS power range channel alarms verified normal
CUES:

(1) "The USS will perform the IV".

STEP 5
SAT UNSAT
Report to USS
@ IPC calorimetric complete and power range channels adjusted

STOP TIME: ________________

Field Notes

*ANSWER KEY ATTACHMENT 1

DATA SHEET 1: PLANT COMPUTER CALORIMETRIC **INITS**

1.0 **ESTABLISH STEADY STATE CONDITIONS:**

1.1 VERIFY Tavg is within ±0.5°F of Tref. ✓

1.2 VERIFY Pressurizer Pressure, Pressurizer Level and Steam Generator Levels are stable. ✓

1.3 PLACE the Control Rods in MANUAL. ✓

2.0 **COLLECT CALORIMETRIC DATA AND CALCULATE REACTOR POWER:**

2.1 Record average Indicated Power over a 10-minute interval, (Use Power Range readings at NI drawer 'A' full power meter):

TIME	N41	N42	N43	N44
0	99	98.5	95.5	98.5
10	/	/	/	/
20	/	/	/	/
TOTAL				
AVERAGE	99	98.5	95.5	98.5

2.2 RECORD Intermediate Range Readings at Control Room signal Processors:

a. Intermediate Range Channel N35 94 %

b. Intermediate Range Channel N36 94 %

DATA SHEET 1: PLANT COMPUTER CALORIMETRIC (continued)

2.3 During full power operation, confirm validity of UQ1118 by verifying the following:

a. RCL AVG DT power (Plant Computer UV0485) less than or equal to 101.0% — 100.3 %

b. TURB FIRST STAGE PRESSURE (Plant Computer Point P0398 and P0399) less than or equal to 101%.

(1) P0398 — 100.4 %

(2) P0399 — 100.4 %

c. If any of the above values are exceeded, NOTIFY the Operations Manager.

NOTE

If Excess Letdown is in service ADD 3 MWT to the Plant Computer 30-minute average prior to entering the value here.

2.4 Record Plant Computer Calorimetric Power, UQ1131 (30-minute Average Total Thermal Power Output). — 3565 MWT (UQ1131)

EXAMINER CUE: UQ1131 READS 3562 MWt

a. If UQ1131 is greater than 3565 MWT, VERIFY that Plant Computer Calorimetric Power UQ1129 (hourly AVG) is less than or equal to 3565 MWT. — N/A MWT (UQ1129)

b. If UQ1129 is greater than 3565 MWT, INITIATE 14915-1, "Special Conditions Surveillance Logs" and PERFORM "Eight-Hour Average Reactor Power Calculation" per Data Sheet 11. — N/A

2.5 Reactor Power (%) $= \frac{\text{(Step 2.4)}}{3565} \times 100$

$= \frac{3565}{3565} \times 100$

= 100 % (Rounded to one decimal place)

100.0 ?

DATA SHEET 1: PLANT COMPUTER CALORIMETRIC (continued)

3.0 DETERMINE NI CHANNEL DEVIATIONS

Round all Deviation values to the nearest tenth (0.1)%.

3.1 Power Range Channel Deviation

	Average Step 2.1	-	Step 2.5	=	Deviation
N41 Channel Deviation =	99 %	-	100.0 %	=	-1.0 %
N42 Channel Deviation =	98.5 %	-	100.0 %	=	-1.5 %
N43 Channel Deviation =	95 %	-	100.0 %	=	-5.0 %
N44 Channel Deviation =	98.5 %	-	100.0 %	=	-1.5 %

3.2 Intermediate Range Channel Deviation

	Step 2.2	-	Step 2.5	=	Deviation
N35 Channel Deviation =	94 %	-	100.0 %	=	-6 %
N36 Channel Deviation =	94 %	-	100.0 %	=	-6 %

3.3 RETURN to Procedure step 5.1.3.

END JPM

PLANT VOGTLE

CONTROL ROOM OPERATOR

JOB PERFORMANCE MEASURE

Respond to Loss of NSCW

Directions to Operator

This information describes the Initial Conditions, Assigned Task, and the TASK Standard. Please ensure you understand the task before beginning. You will be allowed access to any item normally used to perform this task.

Initial Conditions: The plant is at 100% power.

Assigned Task: The USS has directed you to "Assume the duties of the Reactor Operator".

OPERATOR'S NAME: ______________________________

EVALUATION DATE: ___/___/___

JPM TITLE: Respond to Loss of NSCW

COMPLETION TIME: 15 minutes

Application: **RO/SRO**

K/A Number: 000062EG12 RO: 3.3 SRO: 3.3
10CFR55.45 Ref.: 4, 6, 12

Evaluation Method [ ] Performed [ ] Simulated

Evaluation Location [ ] Simulator [ ] Control Room [ ] Unit 1 [ ] Unit 2

Performance Time: _____minutes

OVERALL JPM EVALUATION

[ ] SATISFACTORY [ ] UNSATISFACTORY

Examiner Comments:

Examiner's Signature: ______________________________

Required Items: 18021, Loss of Nuclear Service Cooling Water System

Simulator Setup:

Reset to IC14
Place **BOTH** NSCW Trains in service with pumps 1, 2, 3, & 4 inservice (pumps 5 & 6 in standby)
Stop Containment Cooling Fans 03, 04, 07, and 08
"B" Centrifugal Charging Pump Running
Override HS1608A to STOP
Ack/Reset alarms
Freeze simulator
Insert malfunction NS02B with 10 second time delay

Setup time: 4 minutes

Examiner' Copy

You will be given information describing the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the assigned task before beginning. You will be allowed access to any item normally used to perform this task.

Initial Conditions: The plant is at 100% power.

Assigned Task: The USS has directed you to "Assume the duties of the Reactor Operator".

Task Standard: Plant conditions correctly diagnosed and corrective actions completed.

START TIME: ___________

STEP 1
CRITICAL ( )
SAT UNSAT
Verify only 2 NSCW pumps running in the affected train

Note: *If NSCW pumps on affected train are not placed in PTL, subsequent pump restart will occur after discharge MOV(s) have closed. Pump(s) should be placed in P-T-L for successful performance.*
@ Place all pump switches in the affected train in P-T-L.
@ Pumps 03 and 05 not running
@ Pump 01 positioned to PTL

STEP 2
SAT UNSAT
Disable Diesel Generator
Note: This step may satisfied by depressing BOTH emergency stop pushbuttons on the QEAB or by directing the OAO to place the DG in MAINTENANCE Mode by initiating 13145.
@ DG disabled ***(1)***
@ Maintenace notified ***(2)***
@ Tech Spec actions initiated ***(3)***
CUES:

(1) If requested, "The OAO will initiate 13145 to disable the DG."
(2) If requested, "The USS will notify Maintenance."
(3) If requested, "The USS will initiate Tech Spec actions."

STEP 3
SAT UNSAT
Check affected NSCW train operation

@	Supply header pressure < 70 psig
@	Supply header temperature > 90 °F
@	Supply header flow < 17,000 gpm
@	Return header flow < 17,000 gpm
@	Tower basin level > 73%

STEP 4	
CRITICAL ( )	
SAT UNSAT	
Transfer NSCW loads to the operable train	
@	CCP B running with CCP A in PTL
@	SIP A, CSP A, and RHRP A in PTL
@	Two Train B CCW pumps running with Train A CCW pumps in PTL
@	Train A CREFS in P-T-L
@	Train A ESF Chiller in STOP *(1)*
@	CTB Coolers 3, 4, 7, & 8 running in HIGH speed
@	CTB Aux Cooling Unit Fan 2 running
@	Rx Cavity Cooling Fan 2 running
CUES:	
(1)	When requested, "The USS has notified Maintenance to investigate."

STEP 5
SAT UNSAT
Determine Tech Spec operability requirements
@ TS's for affected systems referenced *(1)*
CUES:

(1) If requested, "The USS is referring to Tech Specs to determine applicability".

STEP 6
SAT UNSAT
Report to USS
@ Operator actions completed

STOP TIME: ________________

Field Notes

PLANT VOGTLE

CONTROL ROOM OPERATOR

JOB PERFORMANCE MEASURE

Reduce Containment Pressure Following CVI

Directions to Operator

This information describes the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the task before beginning. You will be allowed access to any item normally used to perform this task.

Initial Conditions: During a pressure relief operation, a spurious CVI was actuated while I&C was troubleshooting a faulty slave relay. The testing has been terminated and the CVI signal has been reset.

Assigned Task: The USS has verified the existing Gaseous Release Permit is still valid and has directed you to "Initiate containment pressure relief".

OPERATOR'S NAME: ______________________________

EVALUATION DATE: ___/___/___

JPM TITLE: Reduce Containment Pressure Following CVI

COMPLETION TIME: 8 minutes

Application: **RO/SRO**

K/A Number: 029000A103 RO: 3.0 SRO: 3.3
10CFR55.45 Ref.:

Evaluation Method [ ] Performed [ ] Simulated

Evaluation Location [ ] Simulator [ ] Control Room [ ] Unit 1 [ ] Unit 2

Performance Time: ______minutes

OVERALL JPM EVALUATION

[ ] SATISFACTORY **[ ] UNSATISFACTORY**

Examiner Comments:

Examiner's Signature: ______________________________

Required Items: 13125, Containment Purge System

Simulator Setup:

Reset to IC14
Place Mini-Purge supply fan in service per 13125
Remove Mini-Purge supply fan from service when Containment pressure is ~ 0.4 psig
Ack/Reset alarms
Freeze simulator

Setup time: 10 minutes

Examiner's Copy

You will be given information describing the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the assigned task before beginning. You will be allowed access to any item normally used to perform this task.

Initial Conditions: During a pressure relief operation, a spurious CVI was actuated while I&C was troubleshooting a faulty slave relay. The testing has been terminated and the CVI signal has been reset.

Assigned Task: The USS has verified the existing Gaseous Release Permit is still valid and has directed you to "Initiate containment pressure relief".

Task Standard: Containment pressure reduced to zero and pressure relief terminated.

START TIME: ___________

STEP 1

SAT UNSAT

Select procedure and section

@ 13125 section 4.4.1.5 selected *(1) (2)*

@ Containment Sumps monitored during release *(3)*

CUES:

(1) If requested, "The USS does not desire to start additional containment coolers."
(2) When requested, "The USS has obtained an updated gaseous release permit."
(3) "The common RO will monitor the Containment Normal Sump trends."

STEP 2

CRITICAL ( )

SAT UNSAT

Initiate containment pressure relief

@ Containment pressure verified between 0.3 and 4.4 psig

@ Mini-purge exhaust damper HV-12592 closed

@ Verify HV-2632B is open (1)

@ Mini-purge ORC isolation HV-2629B open

@ Mini-purge IRC isolation HV-2628B open *(2)*

CUES:

(1) If requested, "The ABO reports that air is supplied to HV-2632B."
(2) If requested, "The USS has logged the initiation of Cnmt pressure relief and notified Chemistry."

STEP 3
CRITICAL ( )
SAT UNSAT
Place containment mini-purge exhaust fan in service
@ Containment pressure < +0.3 psig
@ Mini-purge exhaust damper HV-12592 open
@ Verify HV-2632B open *(1)*
@ Mini-purge exhaust fan running (HS-2631B in ON position)
@ HV-12592 in AUTO
CUES:

(1) If requested, "The ABO has verified HV-2632B is open."

CAUTION

Containment pressure must be maintained > -0.3 psig.

STEP 4
CRITICAL ( )
SAT UNSAT
Stop pressure relief
@ Containment pressure -0.1 to +0.1 psig
@ Mini-purge fan stopped
@ Mini-purge isolations HV-2628B and HV-2629B closed
@ Mini-purge exhaust damper HV-12592 closed
@ Isolate air supply to HV-2632B *(1)*
CUES:

(1) If requested, "The ABO has isolated air to HV-2632B and verifies that the damper is closed."

STEP 5
SAT UNSAT
Document termination of containment pressure relief
@ Chemistry notified
@ The following valves verified closed using Checklist 3
Preaccess purge inlet HV-2593
Mini-purge exhaust isolations HV-2628B and HV-2629B
Mini-purge supply isolations HV-2626B and HV-2627B
@ Independent verification requested for Checklist 3 (1)
CUES:
(1) "The SSS will perform the IV".

STEP 6
SAT UNSAT
Report to USS
@ Containment pressure relief completed

STOP TIME: _______________

Field Notes

PLANT VOGTLE

CONTROL ROOM OPERATOR

JOB PERFORMANCE MEASURE

Locally Operate Steam Generator ARV

Directions to Operator

This information describes the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the task before beginning. You will be allowed access to any item normally used to perform this task.

° *This is a Time Critical JPM* °

Initial Conditions: Complications from an electrical fault have resulted in a reactor trip and main steamline isolation on Unit 2. The crew has subsequently diagnosed a steam generator tube rupture. Due to the electrical fault, the crew has determined that local ARV operation will be required and has dispatched the ABO to open the breakers for the ARV hydraulic pumps.

Assigned Task: The USS directs you to "Locally open 2-PV-3010 (NMSVR)."

OPERATOR'S NAME: ______________________________

EVALUATION DATE: ___/___/___

JPM TITLE: Locally Operate Steam Generator ARV

COMPLETION TIME: **13 minutes** **TIME CRITICAL**

Note: Performance of this task should begin at the C & T Office.

This time is based on FSAR Chapter 15, table 15.6.3-1, as ammended by REA 97-VAA600

Application: RO/SRO

K/A Number: 000055EG06 RO: 3.8 SRO: 4.1
10CFR55.45 Ref.: 6, 12,

Evaluation Method [ ] Performed [ ] Simulated

Evaluation Location [ ] Simulator [ ] Control Room [ ] Unit 1 [ ] Unit 2

Performance Time: _____minutes

OVERALL JPM EVALUATION

[ ] SATISFACTORY **[ ] UNSATISFACTORY**

Examiner Comments:

Examiner's Signature: ______________________________

Required Items:	18038, Attachment E, Local Operation of the SG ARVs *Provided locally at the handpump stations*		
Component Location:	**SMSVR:**	PV-3000	PV-3030
	NMSVR:	PV-3010	PV-3020

Examiner's Copy

You will be given information describing the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the assigned task before beginning. You will be allowed access to any item normally used to perform this task.

This is a Time Critical JPM

Initial Conditions: Complications from an electrical fault have resulted in a reactor trip and main steamline isolation on Unit 2. The crew has subsequently diagnosed a steam generator tube rupture. Due to the electrical fault, the crew has determined that local ARV operation will be required and has dispatched the ABO to open the breakers for the ARV hydraulic pumps.

Assigned Task: The USS has directed you to "Locally open 2-PV-3010 (NMSVR)."

Task Standard: Steam Generator ARV locally opened.

START TIME: __________ **TIME CRITICAL**

STEP 1 (E1 & E2)
SAT UNSAT
Establish communications with Control Room
Note: *Communications may be established using the sound powered phone system, plant P/A, telephone, or radio.*
The breakers for the ARVs are: *1(2)PV-3000* *1(2)ABB-25*

1(2)PV-3010	*1(2)BBB-25*
1(2)PV-3020	*1(2)BBB-26*
1(2)PV-3030	*1(2)ABB-26*

@	Verify the hydraulic pump breaker is open ***(1)***
@	ARV Local Hand Pump station located
@	Communications established with Control Room ***(2)***
CUES:	

(1) If requested, "The ABO reports that 2-BBB-25 is open." *(see note above)*

(2) Once demonstrated or discussed: "Communications have been established".

STEP 2	
SAT UNSAT	
Align and verify proper operation of hand pump	
@	Level verified in hydraulic fluid reservoir w/in 1" of top of sightglass
@	Selector Valve 2 in NEUTRAL
@	Hand pump bleed off valve closed
@	Hand pump stroked freely

STEP 3 (E3)
CRITICAL
SAT UNSAT
Depressurize ARV accumulator
@ Reservoir Inlet valve 11A closed.
@ Accumulator Dump Pilot Supply valve 11B open.
@ Hand pump stroked to maintain fluid pressure > 2000 psig for 1 minute.
@ Reservoir inlet valve 11A open.
@ Fluid pressure at 0 psig.
@ Accumulator dump pilot supply valve 11B closed.
@ Reservoir inlet valve 11A closed.

STEP 4 (E4)
CRITICAL
SAT UNSAT
Open the ARV
@ Selector Valve 2 in OPEN
@ Hand pump stroked to OPEN selected ARV *(1) (2)*
@ Selector Valve 2 in NEUTRAL
CUES:

(1) If requested: "The Control Room desires that the ARV be fully opened".
(2) After approximately 5 minutes, the control room desires that the ARV be reclosed.

STEP 5
SAT UNSAT
Attempt to close the ARV

@ Candidate attepts to close the valve by relieving the hydraulic pressure.

CUE:

Inform the candidate that after attempting to close the ARV, continuous steam flow is heard and the control rrom has indication that steam generator pressure is decreasing and level is increasing..

Step 6
SAT UNSAT
Close upstream isolation valve 2-1301-U4-137 "S/G 2 ARV Inlet Iso. *(1)*

NOTE:
Candidate may isolate using 2-1301-U4-002 "MS ARV S/G 2 Man Iso. This is an acceptable substitute.

STOP TIME: _______________

STEP 5
SAT UNSAT
Report to USS
@ ARV is open.

Field Notes

ATTACHMENT E

LOCAL OPERATION OF THE STEAM GENERATOR ATMOSPHERIC RELIEF VALVES

E.1 OPEN the breaker for the Hydraulic Operator Pump of the Atmospheric Relief Valve (ARV) intended to be locally operated.

SG1	1-PV-3000	1ABB-25 (AB-118)
SG2	1-PV-3010	1BBB-25 (AB-116)
SG3	1-PV-3020	1BBB-26 (AB-116)
SG4	1-PV-3030	1ABB-26 (AB-118)

E.2 ESTABLISH COMMUNICATIONS between the Shutdown panels and the Main Steam Valve Room ARV Local Hand Pump Station.

E.3 PLACE the Local Hand Pump Station in STANDBY by performing the following steps:

a. CHECK level in hydraulic fluid reservoir (minimum for operation: oil observed in sightglass; normal: oil within 1 inch of top of sightglass),

b. POSITION Selector Valve 2 to NEUTRAL (Valve handle will point directly away from the reservoir),

c. CLOSE the hand pump bleed off valve using the slotted end of the pump handle,

d. STROKE hand pump several times to check free movement,

e. CLOSE the Reservoir Inlet Valve 11A,

f. OPEN the Accumulator Dump Pilot Supply valve 11B,

g. STROKE hand pump until Gauge 8 reads 2000 psig or greater for approximately 1 minute,

NOTE: Maintaining this pressure may be accomplished by applying continuous force downward on the pump handle while monitoring pressure.

h. OPEN the Reservoir Inlet Valve, 11A and allow the pressure on Gauge 8 to drop to 0 psig.

i. CLOSE valve 11B,

j. CLOSE valve 11A.

Sheet 2 of 3

ATTACHMENT E

LOCAL OPERATION OF THE STEAM GENERATOR ATMOSPHERIC RELIEF VALVES

E.4 When directed by the Shutdown panels, LOCALLY POSITION the ARV by performing the following applicable steps:

a. To jack valve in the OPEN direction:

(1) Shift the Selector Valve 2 to the OPEN position,

(2) STROKE the hand pump until the desired valve position (as determined by the Shutdown panels) is obtained,

(3) SHIFT the Selector Valve 2 back to the NEUTRAL position.

b. To jack valve in the CLOSE direction:

(1) SHIFT the Selector Valve 2 to the CLOSE position,

(2) STROKE the hand pump until the desired valve position (as determined by the Shutdown panels) is obtained,

(3) SHIFT the Selector Valve 2 back to the NEUTRAL position.

E.5 When it is desired to TRANSFER CONTROL of the ARV back to the shutdown panels, perform the following steps:

NOTE: It may be desirable to control Reactor Coolant System temperature with one of the other ARVs while re-establishing control of the locally operated ARV to the Shutdown Panels.

a. At the ARV Local Hand Pump Station:

(1) POSITION the Selector Valve 2 to the Neutral position,

(2) OPEN the Reservoir Inlet Valve 11A,

(3) OPEN the hand pump bleed-off valve using the slotted end of the pump handle

ATTACHMENT E

LOCAL OPERATION OF THE STEAM GENERATOR ATMOSPHERIC RELIEF VALVES

b. On the Shutdown panels, ADJUST the ARV controller 1-PIC-3000B (3010B, 3020B, 3030B) for MINIMUM FLOW,

c. CLOSE the breaker to supply power to the ARV hydraulic pump opened in Step E1.

d. ADJUST the ARV controller to maintain Reactor Coolant System temperature as required.

E.6 RETURN to Step in effect.

END OF ATTACHMENT E

PLANT VOGTLE

CONTROL ROOM OPERATOR

JOB PERFORMANCE MEASURE

Manually Isolate a Liquid Waste Release

Directions to Operator

This information describes the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the task before beginning. You will be allowed access to any item normally used to perform this task.

Initial Conditions: During the release of WMT 09, a high alarm was received on RE-0018 and RV-0018 did not close.

Assigned Task: The USS directs you to "Locally isolate the release by closing WMT discharge isolation valves, 2-1901-U4-175 and 2-1901-U4-259".

OPERATOR'S NAME: ______________________________

EVALUATION DATE: ___/___/___

JPM TITLE: Manually Isolate a Liquid Waste Release

COMPLETION TIME: **10 minutes**

Application: **RO/SRO**

K/A Number: 068000A204 RO: 3.3 SRO: 3.3
10CFR55.45 Ref.: 6, 8, 12

Evaluation Method [ ] Performed [ ] Simulated

Evaluation Location [ ] Simulator [ ] Control Room [ ] Unit 1 [ ] Unit 2

Performance Time: _____minutes

OVERALL JPM EVALUATION

[ ] SATISFACTORY [ ] UNSATISFACTORY

Examiner Comments:

Examiner's Signature: ______________________________

Required Items: RWP and associated dosimetry

Component Location: Aux. Bldg, Level D (NOTE: Valve locations are not given in the procedure.)
Unit 2: 2-175 and A-259.

Examiner's Copy

You will be given information describing the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the assigned task before beginning. You will be allowed access to any item normally used to perform this task.

Initial Conditions:	During the release of WMT 09, a high alarm was received on RE-0018 and RV-0018 did not close.
Assigned Task:	The USS directs you to "Locally isolate the release by closing WMT discharge isolation valves, 2-1901-U4-175 and 2-1901-U4-259".
Task Standard:	Liquid waste release locally isolated.

START TIME: ___________

STEP 1
CRITICAL ( )
SAT UNSAT
Manually isolate liquid release
Note: During a release valve 259 would be unlocked and open. The operator should not be required to obtain a key to close the valve.
@ 2-1901-U4-175 located
@ 2-1901-U4-175 closed
@ 2-1901-U4-259 located
@ 2-1901-U4-259 closed

STEP 2
SAT UNSAT
Report to USS
@ Liquid release isolated

STOP TIME: ________________

Field Notes:

PLANT VOGTLE

CONTROL ROOM OPERATOR

JOB PERFORMANCE MEASURE

Reset of the TDAFW Pump Trip and Throttle Valve

Directions to Operator

This information describes the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the task before beginning. You will be allowed access to any item normally used to perform this task.

° *This is a Time Critical JPM* °

Initial Conditions: Unit 1 has experienced a Loss of Heat Sink. A faulty speed sensor resulted in a mechanical overspeed trip of the TDAFWP. Maintenace has repaired the speed sensor and reports the TDAFWP is ready to be reset.

Assigned Task: The USS has directed you to "Reset the mechanical overspeed trip on the Unit 1 TDAFW Pump."

OPERATOR'S NAME: ______________________________

EVALUATION DATE: ___/___/___

JPM TITLE: Reset of the TDAFW Pump Trip and Throttle Valve

COMPLETION TIME: **10 minutes Time Critical**
Performance of this task must be initiated from the Clearance and Tagging Office

Application: NLO/RO/SRO

K/A Number: 000061SG09 RO: 3.8 SRO: 3.9
10CFR55.45 Ref.: 6

Evaluation Method [ ] Performed [ ] Simulated

Evaluation Location [ ] Simulator [ ] Control Room [ ] Unit 1 [ ] Unit 2

Performance Time: ______minutes

OVERALL JPM EVALUATION

[ ] SATISFACTORY [ ] UNSATISFACTORY

Examiner Comments:

Examiner's Signature: ______________________________

Required Items:	13610, Auxiliary Feedwater System (Controlled copy of procedure located locally at AFW Panel)
Component Location:	TDAFWP Room

Examiner's Copy

You will be given information describing the Initial Conditions, Assigned Task, and the Task Standard. Please ensure you understand the assigned task before beginning. You will be allowed access to any item normally used to perform this task.

This is a Time Critical JPM

Initial Conditions:	Unit 1 has experienced a Loss of Heat Sink. A faulty speed sensor resulted in a mechanical overspeed trip of the TDAFWP. Maintenace has repaired the speed sensor and reports the TDAFWP is ready to be reset.
Assigned Task:	The USS has directed you to "Reset the mechanical overspeed trip on the Unit 1 TDAFW Pump, using procedure 13610".
Task Standard:	TDAFW pump mechanical overspeed trip reset.

START TIME: __________ **Time Critical**

STEP 1
SAT UNSAT
Select procedure and section
@ 13610, Section 4.4.7 selected

STEP 2
CRITICAL ( )
SAT UNSAT
Reset Trip and Throttle Valve Mechanical Linkage
Note: Upon arrival the lamp indications on the PAFT are as follows:
Motor Operator: Green lamp lit. Red lamp dark
Valve Actuator: Green lamp lit. Red lamp dark
Trip Indicator: Amber lamp lit
@ Verify motor actuator approximately 80% closed *(1)*
@ Ensure no binding of trip lever tappet (ref. Fig. 3) *(2)*
@ Pull mechanical linkage towards PV-15129 (T / TV)
@ Observe upward motion of trip lever *(3)*
@ Ensure trip lever tappet properly seated
@ Verify trip indicator limit switch roller arm properly positioned *(4)*
CUES:

(1) Provide indication that motor actuator green light is lit and red light is dark on PAFT.
(2) Provide indication that tappet is moving freely.
(3) If performed correctly, provide indication that trip lever has moved upward.
(4) If requested and step performed correctly, provide indication that amber trip indicating light on PAFT is dark.

STEP 3
SAT UNSAT
Report to USS
@ Request Control Room to close HV-5106 *(1)*
CUES:

(1) The BOP will perform steps 4.4.7.6 through 4.4.7.8."

STOP TIME: _______________

Field Notes

UNIT ________

PRB REVIEW REQUIRED

1.0 **PURPOSE**

This procedure provides instructions for taking the unit from Cold Shutdown (Mode 5) with temperature between 71°F and 130°F, to Hot Shutdown (Mode 4) with temperature less than 350°F. (CO 8067, CO 20871)

2.0 **PRECAUTIONS AND LIMITATIONS**

2.1 **PRECAUTIONS**

2.1.1 If this procedure is terminated prior to completion, the Unit Shift Supervisor (USS) should note the reason for the termination in the comments section.

2.1.2 RCS pressure (PI-0403 and/or PI-0405) and temperature shall not exceed 365 psig and 350°F when open to the RHR System. (CO 32981)

2.1.3 The Residual Heat Removal (RHR) pump suction line should not be isolated from the RCS unless there is a steam bubble in the Pressurizer. (CO 3209, CO 3215, CO 3315)

2.1.4 During solid plant operations, the standby Centrifugal Charging Pump (CCP) should be maintained in PULL-TO-LOCK to prevent an RCS pressure transient in the event of a pump automatic start signal. (CO 12263)

2.1.5 The pressurizer boron concentration should not be different from the RCS by more than 50 ppm. Pressurizer Backup Heaters may be energized as necessary to equalize the boron concentration. (CO 3668, CO 12462)

2.1.6 All RCPs must be taken off their back seat and coupled before the RCS is filled to greater than 98% Pressurizer cold calibrated level. Seal Injection piping integrity must be established before coupling an RCP. This will prevent RCS leakage through the pump seal package to containment. (CO 34398, CO 34399)

2.1.7 One Reactor Coolant Pump (RCP) should be running anytime RCS Temperature is changed by more than 10°F in one hour. Additionally, an RCP should not be started if its Steam Generator secondary water temperature is greater than 10 degrees above its RCS loop temperature. (CO 3217)

2.1.8 Whenever the RCS temperature is above 160°F, at least one Reactor Coolant Pump (RCP) should be in operation. RCP 4 is preferred to ensure best spray flow.

2.1.9 To ensure thorough mixing, at least one RCP must be in operation while chemicals are being added to the RCS or while the boron concentration is being changed. (CO 29394)

2.1.10 After any significant change in charging flow, the RCP seal injection flows should be checked and adjusted as necessary.

2.1.11 Do not add positive reactivity by more than one controlled method at a time while the reactor is subcritical.

2.1.12 During RCS filling, the Source Range should be monitored. If an unexplained increase in neutron count rate occurs, immediately terminate the fill and investigate.

2.1.13 If the count rate on either source range channel increases unexpectedly by a factor of two or more during any operation, the operation must be suspended immediately until a satisfactory evaluation of the situation has been made. (CO 1331)

2.1.14 During RCS dilution or heatup, source range neutron detector count rate should be evaluated for impact on the High Flux at Shutdown Alarm (HFASA) setpoint. (CO 33053)

2.1.15 Criticality must be anticipated any time the rods are being withdrawn or when dilution operations are in progress.

2.1.16 At least one Source Range Nuclear Instrument channel should be selected to the NR-45 Recorder.

2.1.17 While performing oxygen-scavenging operations using hydrazine, the Chemical and Volume Control System (CVCS) letdown demineralizers should be bypassed and letdown flow diverted to the Volume Control Tank (VCT).

2.1.18 Prior to returning letdown flow through the CVCS demineralizers after hydrazine addition, the total ammonia and hydrazine concentration of the RCS should be less than 1.0 ppm.

2.1.19 Hydrazine should be added to the RCS for oxygen scavenging during the following operating conditions:

a. Prior to exceeding RCS temperature of 180°F, hydrazine should be added to the RCS for oxygen scavenging.

b. Prior to exceeding RCS temperature of 210°F, oxygen concentration will be below 2.0 ppm,

c. Prior to exceeding RCS temperature of 250°F, oxygen concentration shall be less than or equal to 0.10 ppm.

2.1.20 Pressurizer water level should be maintained greater than the low-low level setpoint of 17%.

2.1.21 Limit to the extent practical the number of times Pressurizer spray flow is cycled. Note in the Unit Control Log occurrences of spray initiation with a pressurizer steam space/spray fluid temperature differential greater than 125°F.

2.1.22 The differential temperature between the pressurizer liquid space and the Loop 4 Hot Leg shall be maintained at less than 320°F during unit heatup. (CO 18331)

2.1.23 Steam used to preheat the steam lines and secondary plant should be drawn from the steam generators slowly. This will permit controlled addition of auxiliary feedwater, reducing thermal stresses on the feedwater nozzles.

2.2 LIMITATIONS

2.2.1 The RCS pressure, temperature, and heatup and cooldown rate shall be maintained within the operating region of the RCS Pressure Temperature Limits Curve (TS LCO 3.4.3 and PTLR). (CO 15886)

2.2.2 The maximum heatup of the RCS shall be limited to 100°F in any one hour period. (TS LCO 3.4.3 and PTLR)

2.2.3 The maximum heatup of the Pressurizer shall be limited to 100°F in any one hour period. (TR 13.4.2a)

2.2.4 The maximum temperature differential between auxiliary spray water and PRZR steam space is 625°F. (TR 13.4.2c) (CO 32010)

2.2.5 Before auxiliary spray is initiated with a temperature difference between the Pressurizer steam space and the spray fluid exceeding 320°F, notify the Unit Shift Supervisor (USS). (TS LCO 5.5.5) (CO 18331)

2.2.6 The pressure of the reactor and secondary coolants in the SG shall be less than or equal to 200 psig when the temperature of the reactor or secondary coolant in any SG is less than or equal to 70°F. (TR 13.7.1)

2.2.7 A primary to secondary pressure differential shall not exceed 1600 psid or a secondary to primary pressure differential of 670 psid during unit operations or leak tests.

2.2.8 In Mode 5 with the RCS loops not filled, two RHR loops shall be operable and one RHR loop shall be in operation. Each valve used to isolate unborated water sources listed in 14228, "Operations Monthly Surveillance Logs", shall be secured in the closed position. Valves 1208-U4-176 and 1208-U4-177 may be opened under administrative control provided the RCS is in compliance with the SHUTDOWN MARGIN requirements of LCO 3.1.1 and the HFASA is OPERABLE. (TS LCO 3.4.8) (CO 29816)

2.2.9 In Mode 5 with the RCS loops filled (above RV flange elevation of 194 ft.), at least one RHR loop shall be operable and in operation. One additional RHR loop shall be operable or the secondary side of at least two steam generators levels shall be greater than the highest point of the SG U-tubes and capable of removing heat by natural circulation flow. (TS LCO 3.4.7 and Bases). (CO 32573)

Natural Circulation capability will be ensured if:

a. RCS loops and RV filling and venting is completed,

b. RCS pressure is maintained above 100 psig since the most recent filling and venting,

c. Two applicable SGs secondary water levels are greater than 63% wide range or an equivalent narrow range level above the highest point of the SG U-tubes (See PTDB), and

d. A source of makeup is available to the applicable SGs.

2.2.10 In Modes 4 and 5, all SI pumps shall be incapable of injecting into the RCS and the SI Accumulators shall be isolated per TS LCO 3.4.12. In addition, at least one of the following groups of Cold Over Pressure Protection Devices shall be operable when the RCS is not depressurized through an RCS vent of greater than or equal to 2.14 square inches (based on an equivalent length of 10 feet of pipe). (TS LCO 3.4.12) (CO 3215)

a. Two PORVs with lift settings which do not exceed the limits established in the PTLR, or

b. Two RHR Suction relief valves each with a setpoint at or between 440 psig and 460 psig, or

c. One RHR Suction Relief Valve and one PORV with setpoints as described above.

2.2.11 In Mode 5 with RCS level between 191' and 207' feet elevation, (15% PRZR cold calibrated level), an adequate vent path is:

a. Less than 16 days after shutdown or with the core having more than 2/3 irradiated fuel:

(1) A minimum of three pressurizer code safeties removed,

-OR-

(2) The pressurizer manway removed.

b. The vent requirements can be reduced to a minimum of one code safety removed provided the following conditions have been met:

(1) It has been 16 days or more since shutdown,

- AND -

(2) There is less than or equal to two-thirds spent fuel in the core,

- AND -

(3) The RWST is greater than or equal to 86%.

2.2.12 In Mode 4, at least two RCS loops and/or RHR loops shall be operable and at least one of the RCS loops and/or RHR loops shall be in operation. (TS LCO 3.4.6)

2.2.13 In Mode 4, an RCP shall not be started unless the secondary water temperature of each Steam Generator is less than 50°F above each of the Reactor Coolant System cold leg temperatures. With no Reactor Coolant Pump running, this value is reduced to 25°F at an RCS temperature of 350°F and varies linearly to 50°F at an RCS temperature of 200°F. (TS LCO 3.4.6 Note 2)

2.2.14 In Modes 4 and 5, shutdown margin shall be greater than or equal to the limit specified in the COLR. (TS LCO 3.1.1) (CO 3126)

2.2.15 In Modes 4 and 5, two channels of source range HI FLUX AT SHUTDOWN ALARM (HFASA) shall be operable with a setpoint of less than or equal to 2.30 times background. (TS LCO 3.3.8)

2.2.16 In Modes 4 and 5 with RTBs closed and the Rod Control System capable of rod withdrawal, two Source Range Nuclear Instruments shall be operable. With RTBs open, one channel shall be operable. (TS LCO 3.3.1 Table 3.3.1-1, Function 5).

UNIT ______ INITIALS

A4.4 **RCS HEATUP TO 180°F to 190°F**

NOTE

For reactor shutdowns where ALL RCPs are not stopped, step A4.4.1 may be marked N/A.

A4.4.1 The Manager Operations or Unit Superintendent has determined, based on the conduct of refueling or outage operations, that special procedures for starting the first RCP, to ensure a potential dilution event does not occur, are not required. (SOER 94-2) ______

A4.4.2 Prior to starting RCPs, VERIFY its SG water temperature is less than 10°F greater than its RCS loop temperature per 13003, "Reactor Coolant Pump Operation". RECORD the following information. (CO 12460)

NOTE

If any SG TI or Blowdown not available, then the SG metal surface should be measured with contact pyrometer.

a. Loop 1:
SG Temp ______°F - TI-1175 (IPC T9883)

Tc ______°F - TI-413B (IPC T0406) = dT ______°F

b. Loop 2:
SG Temp ______°F - TI-1176 (IPC T9884)

Tc ______°F - TI-423B (IPC T0426) = dT ______°F

c. Loop 3:
SG Temp ______°F - TI-1177 (IPC T9885)

Tc ______°F - TI-433B (IPC T0446) = dT ______°F

d. Loop 4:
SG Temp ______°F - TI-1178 (IPC T9886)

Tc ______°F - TI-443B (IPC T0466) = dT ______°F

If used, Pyrometer I.D. No. ________

UNIT _______ INITIALS

A4.4.3 COMMENCE RCS/Pressurizer pressure and temperature trending at 30-minute intervals using Data Sheet 1 and Plant Computer or Figure 1. (SR 3.4.3.1 and TRS 13.4.2.1) (CO 518, CO 519, CO 30447, CO 30631, CO 32008, CO 32012, CO 12942, CO 12943) _______

Data taking and plotting may be suspended during holds in the heatup if the duration is expected to exceed one hour.

A4.4.4 COMMENCE THE RCS heatup to 180°F to 190°F at a rate not to exceed 100°F in any one hour as follows:

a. HOLD RCS pressure at 340 psig ±25 psig (PI-0403 and/or PI-0405) by operation of PIC-0131, _______

b. ENSURE Pressurizer Spray Valves PV-0455B and PV-0455C CLOSED, _______

CAUTION

With SG Temperature higher than RCS temperature, expect a pressure rise upon the first RCP start. With SG Temperature less than RCS, expect pressure drop. Be prepared to prevent extreme pressure fluctuations by operating PV-131 in manual.

NOTE

It is preferred to start two pumps if conditions permit. RCP 4 should be the first pump started to ensure adequate spray flow.

c. Start two RCPs, preferably RCPs 4 and 1, per 13003, "Reactor Coolant Pump Operation", (CO 12460) _______

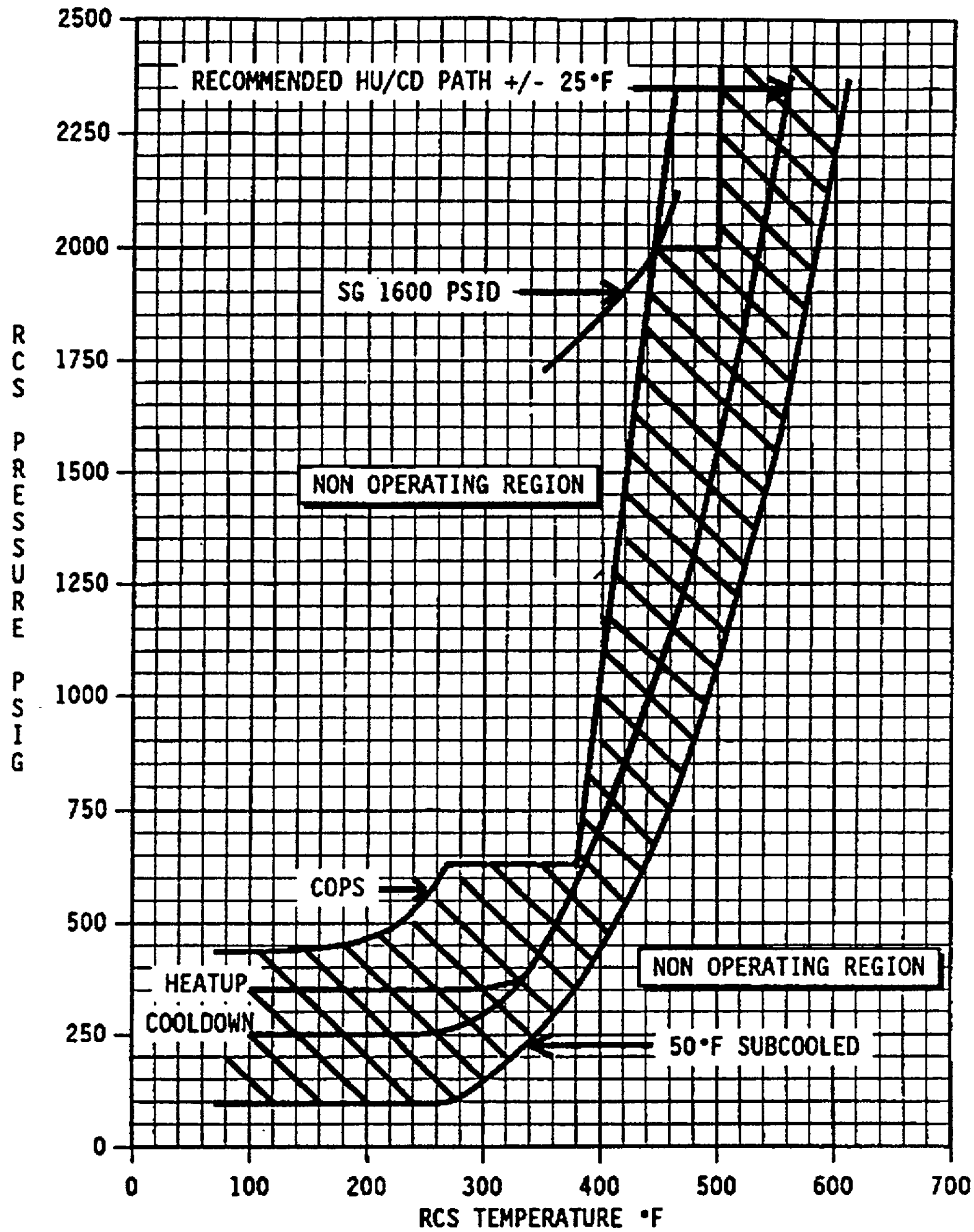
- OR -

START at least one RCP, preferably RCP 4, per 13003, "Reactor Coolant Pump Operation", (CO 12460) _______

d. REDUCE RHR cooling by adjusting RHR HX Outlet Valves HV-0606 and/or HV-607. _______

A4.4.5 REQUEST Chemistry to sample the RCS and Pressurizer and begin establishing Lithium and Oxygen control for heatup. _______

FIGURE 1 - RCS Pressure - Temperature Control For Heatup Or Cooldown



NOTE:

Figure 1 is a composite curve using conservative data. See PTLR and PLS for actual setpoints.

UNIT NO. ______Sheet 1 of 1

1.0 **PURPOSE**

This procedure provides instructions for operation of the Containment Mini-Purge System, Main (Preaccess) Purge System and the Preaccess Filter Units. Instructions are provided as follows:

4.1.1 Purge System Alignment

4.1.2 Mini-Purge System Startup

4.1.3 Main (Preaccess) Purge System Startup

4.2.1 Preaccess Filter Unit Operation

4.3.1 Main (Preaccess) Purge System Shutdown

4.3.2 Mini-Purge System Shutdown

4.4.1 Containment Pressure Relief

4.4.2 Raising Containment Pressure

2.0 **PRECAUTIONS AND LIMITATIONS**

2.1 **PRECAUTIONS**

Containment Main Purge Isolation Valves 1-HV-2626A, 1-HV-2627A, 1-HV-2628A and 1-HV-2629A are sealed and leak tested (LLRT'd). Use Main Purge only if absolutely necessary.

2.2 **LIMITATIONS**

2.2.1 The ODCM Section 3.1.1 Table 3-1 specifies Plant Vent Radiation Monitor operability requirements.

2.2.2 Technical Specification LCO 3.6.4 requires containment pressure to be maintained between -0.3 psig and +1.8 psig in Modes 1, 2, 3 and 4.

2.2.3 Containment pressure should be maintained between -0.1 psig and 1.0 psig. Before containment pressure reaches 1.0, initiate pressure relief. If containment pressure is less than -0.1 psig, raise pressure.

2.2.4 It is desirable to commence containment pressure relief prior to reaching +0.3 psi to allow for proper operation of Filter Unit Heater. A high moisture alarm may be received during pressure relief. The moisture alarm should clear after approximately 5 minutes of CTB Mini-Purge Fan operation.

2.2.5 When monitoring and changing containment pressure under this procedure, monitor containment pressure using 1-PI-10945 (QHVC) or P-9871 (plant computer point). These are the only containment pressure instruments that will indicate a negative pressure.

2.2.6 Technical Specification LCO 3.6.3 applies in Modes 1, 2, 3 and 4 and requires the following surveillance requirements:

a. Each Main (24") Purge Supply and Exhaust Valve (1-HV-2626A, 1-HV-2627A and 1-HV-2628A, 1-HV-2629A) shall be closed and sealed closed,

b. Each Mini (14") Purge Supply and Exhaust Valve (1-HV-2626B, 1-HV-2627B and 1-HV-2628B, 1-HV-2629B) shall be operable,

c. The Mini (14") Purge Valves shall be maintained closed except when in the opinion of the Unit Shift Supervisor or Shift Superintendent they need to be opened for pressure control, for ALARA and respirable air quality considerations for personnel entry and for surveillance and maintenance testing that require the valves to be open.

2.2.7 For ALARA and respirable air quality, the Mini-Purge System should be placed in service approximately 48 hours prior to planned containment entries. After work is complete and all personnel have exited containment, the Mini-Purge System should be shut down.

2.2.8 Technical Specification LCO 3.6.3 applies in Modes 1, 2, 3 and 4 and requires each Containment Isolation Valve be operable.

2.2.9 Technical Specification LCO 3.9.4 requires each penetration providing direct access from the containment atmosphere to the outside atmosphere to be either:

a. Closed by a manual valve or automatic isolation valve, blind flange, or equivalent, or

b. Capable of being closed by an OPERABLE automatic Containment Ventilation Isolation System.

2.2.10 Technical Specifications LCO 3.3.6 and LCO 3.9.4 require the Containment Ventilation Isolation System to be operable during core alterations or movement of irradiated fuel within containment.

2.2.11 Containment purges may be stopped and subsequently restarted without any sampling and analysis being performed and without Effluent Permit closure if the restart occurs within 72 hours of the last purge being stopped, the reason for the purge has not changed, and 1-RE-2562-C reading has not increased by more than a factor of 3 from the reading obtained at purge sampling time (logged on Data Sheet 1 of 36022-C, "Containment Purge Permitting And Chemistry Monitoring".

3.0 PREREQUISITES OR INITIAL CONDITIONS

NONE

4.0 INSTRUCTIONS

NOTE

All start/stop times of CTB Purge Supply and Exhaust Fans associated with a CTB release should be logged on Data Sheet 3 of 36022-C, "Containment Purge And Vent Permitting And Chemistry Monitoring".

4.1 STARTUP

4.1.1 Purge System Alignment

4.1.1.1 ALIGN the purge system remote-operated components per Checklist 1.

4.1.1.2 If required, PERFORM 11125-1, "Containment Purge System Alignment".

4.1.2 Mini-Purge System Startup

NOTE

The Mini-Purge System may be used for containment pressure control, for ALARA and respirable air quality considerations for personnel entry and for surveillance tests that require the valves to be open.

4.1.2.1 If the Unit is in Mode 1, 2, 3, or 4, REVIEW Limitation 2.2.6c and 2.2.8.

4.1.2.2 If the unit is in Mode 5, 6 or defueled and the Containment Equipment Hatch is open, OPERATE the Containment Mini-purge System with the Exhaust Fan on and Supply Fan off to ensure airflow is maintained into the building.

4.4 NON PERIODIC OPERATION

NOTES

a. All start/stop times of Containment Purge Supply and Exhaust Fans associated with a Containment pressure release should be logged on Data Sheet 3 of 36022-C.

b. When monitoring and changing containment pressure during this procedure, computer point P-9871 or 1-PI-10945 (QHVC) should be used. These are the only containment pressure instruments that will indicate a negative pressure.

4.4.1 Containment Pressure Relief

4.4.1.1 If the Unit is in Mode 1, 2, 3 or 4:

a. REVIEW Limitation 2.2.6c and 2.2.8.

b. PLACE additional containment cooling units in service if desired to correct the high pressure condition.

4.4.1.2 NOTIFY Chemistry of the Mini-Purge operation and OBTAIN the current approved Containment Gaseous Release Permit. If an updated permit is unavailable, REQUEST that Chemistry sample the containment atmosphere and prepare for the gaseous release.

4.4.1.3 When a current approved Containment Gaseous Release Permit is obtained, CONTINUE with this section.

CAUTION

Do not initiate the pressure relief until the current approved Containment Gaseous Release Permit is obtained.

NOTE

Notify HP that the area around the Equipment Building and the Personnel Access Hatch will have an increase in airborne concentrations during Mini-Purge operation.

4.4.1.4 If containment pressure is less than or equal to +0.3 psig, INITIATE pressure relief to zero ±0.1 psig as follows:

a. OPEN CTB MINI-PURGE EXH DMPR 1-HV-12592 (C34),

b. OPEN CTB MINI-PURGE EXH ORC ISO VLV-MINI 1-HV-2629B (B34),

c. OPEN CTB MINI-PURGE EXH IRC ISO VLV-MINI 1-HV-2628B (A34),

d. OPEN CTB MINI-PURGE EXH DMPR 1-HV-2632B (valve is opened by ensuring air supply to this FC valve),

e. START the CTB MINI-PURGE EXHAUST FAN using 1-HS-2631B (D34),

f. PLACE the CTB MINI-PURGE EXH DMPR 1-HS-12592 in AUTO (C34),

g. LOG the EXHAUST FAN START TIME on Data Sheet 3 of 36022-C.

CAUTION

Do not initiate the pressure relief until the current approved Containment Gaseous Release Permit is obtained.

NOTES

a. Notify HP that the area around the Equipment Building and the Personnel Access Hatch will have an increase in airborne concentrations during Mini-Purge operation.

b. Heater will not energize until CTB Mini-Purge Fan is started and pressure in Filter Housing is negative.

c. Annunciator ALB-52-B07, CNMT PURGE EXH FLTR HI MSTR alarm may come in when pressure relief is initiated. It should clear after approximately 5 minutes of CTB Mini-Purge Fan operation.

4.4.1.5 If containment pressure is greater than +0.3 psig and less than or equal to +4.4 psig, INITIATE pressure relief to zero ±0.1 psig as follows:

NOTE

The following pressure relief is via Flow Orifice 1-FO-12593.

a. ENSURE CTB MINI-PURGE EXH DMPR 1-HV-12592 is CLOSED (C34),

b. OPEN CTB MINI-PURGE EXH DMPR 1-HV-2632B (valve is opened by ensuring air supply to this FC valve),

c. OPEN CTB MINI-PURGE EXH ORC ISO VLV-MINI 1-HV-2629B (B34),

d. OPEN CTB MINI-PURGE EXH IRC ISO VLV-MINI 1-HV-2628B (A34),

e. LOG the pressure relief START TIME on Data Sheet 3 of 36022-C.

4.4.1.6 NOTIFY Chemistry that pressure relief has commenced. RECORD the name of the person contacted in the Unit Control Log.

4.4.1.7 When CTB pressure drops below +0.3 psig, PERFORM the following:

a. OPEN CTB MINI-PURGE EXH DMPR 1-HV-12592 (C34),

b. ENSURE OPEN CTB MINI-PURGE EXH DMPR 1-HV-2632B (valve is opened by ensuring air supply to this FC valve, valve may have been opened in step 4.4.1.5c),

c. START the CTB MINI-PURGE EXH FAN using 1-HS-2631B (D34),

d. PLACE the CTB MINI-PURGE EXH DMPR 1-HS-12592 in AUTO (C34).

CAUTION

Containment pressure must be maintained above -0.3 psig.

4.4.1.8 MONITOR containment pressure.

4.4.1.9 If pressure relief was performed as part of Mini-Purge System Startup, RETURN to Step 4.1.2.9.

4.4.1.10 When containment pressure falls to zero ±0.1 psig, TERMINATE pressure relief as follows:

a. RECORD the Final Containment pressure on the Containment Gaseous Release Permit Data Sheet 3,

b. STOP the CTB MINI-PURGE EXH FAN,

c. CLOSE CTB MINI PURGE EXH ORC ISO VLV-MINI 1-HV-2629B (B340,

d. CLOSE CTB NORM PURGE EXH IRC ISO VLV-MINI 1-HV-2628B (A34),

e. ENSURE CLOSED CTB MINI PURGE EXH DMPR 1-HV-12592 (C34),

f. CLOSE CTB MINI-PURGE EXH DMPR 1-HV-2632B (valve is closed by isolating air supply to this FC valve, vent valve 1-HV-2632B2 should be open when air is isolated to 1-HV-2632B),

g. LOG the pressure relief STOP TIME on Data Sheet 3 of 36022-C,

h. NOTIFY Chemistry that containment pressure relief has been terminated. RECORD the name of the person contacted in the Unit Control Log,

i. RESTORE the Mini-Purge System per Checklist 3.

CHECKLIST 3 - MINI-PURGE SYSTEM RESTORATION

Sheet 1 of 1

COMPONENT	DESCRIPTION	POSITION	LINEUP (INITIALS)	VERIFICATION (INITIALS)
1-HS-2593	CTB PREACCESS PURGE SPLY UNIT INLET DMPR	CLOSED	______	______
1-HS-2628B	CTB NORM PURGE EXH IRC ISO VLV-MINI	CLOSED	______	______
1-HS-2629B	CTB NORM PURGE EXH ORC ISO VLV-MINI	CLOSED	______	______
1-HS-2626B	CTB NORM PURGE SPLY IRC ISO VLV-MINI	CLOSED	______	______
1-HS-2627B	CTB NORM PURGE SPLY ORC ISO VLV-MINI	CLOSED	______	______
1-HV-2632B	CTB MINI-PURGE EXH DMPR (VALVE IS CLOSED BY ISOLATING AIR SUPPLY TO THIS FC VALVE)	CLOSED	______	______

REVIEWED BY: ______________________________ DATE ____________

1.0 PURPOSE

This procedure provides instructions for operation of the Containment Mini-Purge System, Main (Preaccess) Purge System and the Preaccess Filter Units. Instructions are provided as follows:

4.1.1 Purge System Alignment

4.1.2 Mini-Purge System Startup

4.1.3 Main (Preaccess) Purge System Startup

4.2.1 Preaccess Filter Unit Operation

4.3.1 Main (Preaccess) Purge System Shutdown

4.3.2 Mini-Purge System Shutdown

4.4.1 Containment Pressure Relief

4.4.2 Raising Containment Pressure

2.0 PRECAUTIONS AND LIMITATIONS

2.1 PRECAUTIONS

Containment Main Purge Isolation Valves 2-HV-2626A, 2-HV-2627A, 2-HV-2628A and 2-HV-2629A are sealed and leak tested (LLRT'd). Use Main Purge only if absolutely necessary.

2.2 LIMITATIONS

2.2.1 The ODCM section 3.1.1, Table 3-1 specifies Plant Vent Radiation Monitor operability requirements.

2.2.2 Technical Specification LCO 3.6.4 requires containment pressure to be maintained between -0.3 psig and +1.8 psig in Modes 1, 2, 3 and 4.

2.2.3 Containment pressure should be maintained between -0.1 psig and 1.0 psig. Before containment pressure reaches 1.0 psig, initiate pressure relief. If containment pressure is less than -0.1 psig, raise pressure.

2.2.4 It is desirable to commence containment pressure relief prior to reaching +0.3 psi to allow for proper operation of Filter Unit Heater. A high moisture alarm may be received during pressure relief. The moisture alarm should clear after approximately 5 minutes of CTB Mini-Purge Fan operation.

2.2.5 When monitoring and changing containment pressure under this procedure, monitor containment pressure using 1-PI-10945 (QHVC) or P-9871 (plant computer point). These are the only containment pressure instruments that will indicate a negative pressure.

2.2.6 Technical Specification LCO 3.6.3 applies in Modes 1, 2, 3 and 4 and requires the following surveillance requirements:

a. Each Main (24") Purge Supply and Exhaust Valve (2-HV-2626A, 2-HV-2627A and 2-HV-2628A, 2-HV-2629A) shall be closed and sealed closed,

b. Each Mini (14") Purge Supply and Exhaust Valve (2-HV-2626B, 2-HV-2627B and 2-HV-2628B, 2-HV-2629B) shall be operable,

c. The Mini (14") Purge Valves shall be maintained closed except when in the opinion of the Unit Shift Supervisor or Shift Superintendent they need to be opened for pressure control, for ALARA and respirable air quality considerations for personnel entry and for surveillance and maintenance testing that require the valves to be open.

2.2.7 For ALARA and respirable air quality, the Mini-Purge System should be placed in service approximately 48 hours prior to planned containment entries. After work is complete and all personnel have exited containment, the Mini-Purge System should be shut down.

2.2.8 Technical Specification LCO 3.6.3 applies in Modes 1, 2, 3 and 4 and requires each Containment Isolation Valve be operable.

2.2.9 Technical Specification LCO 3.9.4 requires each penetration providing direct access from the containment atmosphere to the outside atmosphere to be either:

a. Closed by a manual valve or automatic isolation valve, blind flange, or equivalent, or

b. Capable of being closed by an OPERABLE automatic Containment Ventilation Isolation System.

2.2.10 Technical Specification LCO 3.3.6 and LCO 3.9.4 requires the Containment Ventilation Isolation System to be operable during core alterations or movement of irradiated fuel within containment.

2.2.11 Containment purges may be stopped and subsequently restarted without any sampling and analysis being performed and without Effluent Permit closure if the restart occurs within 72 hours of the last purge being stopped, the reason for the purge has not changed, and 2-RE-2562-C reading has not increased by more than a factor of 3 from the reading obtained at purge sampling time (logged on Data Sheet 1 of 36022-C, "Containment Purge Permitting And Chemistry Monitoring".

3.0 **PREREQUISITES OR INITIAL CONDITIONS**

NONE

4.0 **INSTRUCTIONS**

NOTE

All start/stop times of CTB Purge Supply and Exhaust Fans associated with a CTB release should be logged on Data Sheet 3 of 36022-C, "Containment Purge And Vent Permitting And Chemistry Monitoring".

4.1 **STARTUP**

4.1.1 **Purge System Alignment**

4.1.1.1 ALIGN the purge system remote-operated components per Checklist 1.

4.1.1.2 If required, PERFORM 11125-2, "Containment Purge System Alignment".

4.1.2 **Mini-Purge System Startup**

NOTE

The Mini-Purge System may be used for containment pressure control, for ALARA and respirable air quality considerations for personnel entry and for surveillance tests that require the valves to be open.

4.1.2.1 If the Unit is in Mode 1, 2, 3, or 4, REVIEW Limitation 2.2.6c and 2.2.8.

4.1.2.2 If the unit is in Mode 5, 6 or defueled and the Containment Equipment Hatch is open, OPERATE the Containment Mini-purge System with the Exhaust Fan on and Supply Fan off to ensure airflow is maintained into the building.

4.4 NON PERIODIC OPERATION

NOTES

a. All start/stop times of Containment Purge Supply and Exhaust Fans associated with a Containment pressure release should be logged on Data Sheet 3 of 36022-C.

b. When monitoring and changing containment pressure during this procedure, computer point P-9871 or 2-PI-10945 (QHVC) should be used. These are the only containment pressure instruments that will indicate a negative pressure.

4.4.1 **Containment Pressure Relief**

4.4.1.1 If the Unit is in Mode 1, 2, 3 or 4:

a. REVIEW Limitation 2.2.6c and 2.2.8.

b. PLACE additional containment cooling units in service if desired to correct the high pressure condition.

4.4.1.2 NOTIFY Chemistry of the Mini-Purge operation and OBTAIN the current approved Containment Gaseous Release Permit. If an updated permit is unavailable, REQUEST that Chemistry sample the containment atmosphere and prepare for the gaseous release.

4.4.1.3 When a current approved Containment Gaseous Release Permit is obtained, CONTINUE with this section.

CAUTION

Do not initiate the pressure relief until the current approved Containment Gaseous Release Permit is obtained.

NOTE

Notify HP that the area around the Equipment Building and the Personnel Access Hatch will have an increase in airborne concentrations during Mini-Purge operation.

4.4.1.4 If containment pressure is less than or equal to +0.3 psig, INITIATE pressure relief to zero ±0.1 psig as follows:

a. OPEN CTB MINI PURGE EXH DMPR 2-HV-12592 (C34),

b. OPEN CTB MINI PURGE EXH ORC ISO VLV-MINI 2-HV-2629B (B34),

c. OPEN CTB NORM PURGE EXH IRC ISO VLV-MINI 2-HV-2628B (A34),

d. OPEN CTB MINI-PURGE EXH DMPR 2-HV-2632B (valve is opened by ensuring air supply to this FC valve),

e. START the CTB MINI-PURGE EXH FAN using 2-HS-2631B (D34),

f. PLACE THE CTB MINI PURGE EXH DMPR 2-HV-12592 in AUTO (C34),

g. LOG the EXH FAN START TIME on Data Sheet 3 of 36022-C.

CAUTION

Do not initiate the pressure relief until the current approved Containment Gaseous Release Permit is obtained.

NOTES

a. Notify HP that the area around the Equipment Building and the Personnel Access Hatch will have an increase in airborne concentrations during Mini-Purge operation.

Heater will not energize until CTS Mini-Purge Fan is started and pressure in Filter Housing is negative.

c. Annunciator ALB-52-B07, CNMT PURGE EXH FLTR HI MSTR alarm may come in when pressure relief is initiated. It should clear after approximately 5 minutes of CTB Mini-Purge Fan operation.

4.4.1.5 If containment pressure is greater than +0.3 psig and less than or equal to +4.4 psig, INITIATE pressure relief to zero ±0.1 psig as follows:

NOTE

The following pressure relief is via Flow Orifice 2-FO-12593.

a. ENSURE CTB MINI PURGE EXH DMPR 2-HV-12592 is CLOSED (C34),

b. OPEN CTB MINI-PURGE EXH DMPR 2-HV-2632B (valve is opened by ensuring air supply to this FC valve),

c. OPEN CTB MINI PURGE EXH ORC ISO VLV-MINI 2-HV-2629B (B34),

d. OPEN CTB NORM PURGE EXH IRC ISO VLV-MINI 2-HV-2628B (A34),

e. LOG the pressure relief START TIME on Data Sheet 3 of 36022-C.

4.4.1.6 NOTIFY Chemistry that pressure relief has commenced. RECORD the name of the person contacted in the Unit Control Log.

4.4.1.7 When CTB pressure drops below +0.3 psig, PERFORM the following:

a. OPEN CTB MINI PURGE EXH DMPR 2-HV-12592 (C34),

b. ENSURE OPEN CTB MINI-PURGE EXH DMPR 2-HV-2632B (valve is opened by ensuring air supply to this FC valve, valve may have been opened in step 4.4.1.5c),

c. START the CTB MINI PURGE EXH FAN using 2-HS-2631B (D34),

d. PLACE the CTB MINI PURGE EXH DMPR 2-HV-12592 in AUTO (C34).

CAUTION

Containment pressure must be maintained above -0.3 psig.

4.4.1.8 MONITOR containment pressure.

4.4.1.9 If pressure relief was performed as part of Mini-Purge System Startup, RETURN to Step 4.1.2.9.

4.4.1.10 When containment pressure falls to zero ±0.1 psig, TERMINATE pressure relief as follows:

a. RECORD the Final Containment pressure on the Containment Gaseous Release Permit Data Sheet 3,

b. STOP the CTB Mini-Purge Exhaust Fan,

c. CLOSE CTB MINI PURGE EXH ORC ISO VLV-MINI 2-HV-2629B (B34),

d. CLOSE CTB NORM PURGE EXH IRC ISO VLV-MINI 2-HV-2628B (A34),

e. ENSURE CLOSED CTB MINI PURGE EXH DMPR 2-HV-12592 (C34),

f. CLOSE CTB MINI-PURGE EXH DMPR 2-HV-2632B (valve is closed by isolating air supply to this FC valve),

g. LOG the pressure relief STOP TIME on Data Sheet 3 of 36022-C,

h. NOTIFY Chemistry that containment pressure relief has been terminated. RECORD the name of the person contacted in the Unit Control Log,

i. RESTORE the Mini-Purge System per Checklist 3.

CHECKLIST 3 Sheet 1 of 1

MINI-PURGE SYSTEM RESTORATION

COMPONENT	DESCRIPTION	POSITION	LINEUP (INITIALS)	VERIFICATION (INITIALS)
2-HS-2593	CTB PREACCESS PURGE SPLY UNIT INLET DMPR	CLOSED	______	______
2-HS-2628B	CTB NORM PURGE EXH IRC ISO VLV-MINI	CLOSED	______	______
2-HS-2629B	CTB NORM PURGE EXH ORC ISO VLV-MINI	CLOSED	______	______
2-HS-2626B	CTB NORM PURGE SPLY IRC ISO VLV-MINI	CLOSED	______	______
2-HS-2627B	CTB NORM PURGE SPLY ORC ISO VLV-MINI	CLOSED	______	______
2-HV-2632B	CTB MINI-PURGE EXH DMPR (VALVE IS CLOSED BY ISOLATING AIR SUPPLY TO THIS FC VALVE)	CLOSED	______	______

REVIEWED BY: ______________________________ DATE ____________

1.0 **PURPOSE**

This procedure provides the necessary instructions for startup, operation and shutdown of the RCPs. Procedure instructions include the following steps:

4.1.1 Aligning an RCP for Standby

4.1.2 Starting an RCP

4.2.1 Pump Operation with A Seal Abnormality

4.3.1 Stopping an RCP

4.4.1 Filling RCP Standpipe

4.4.2 Restoring Seal Injection Flow and Coupling RCPs

4.4.3 Uncoupling and Backseating RCPs and Securing Seal Injection Flow

2.0 **PRECAUTIONS AND LIMITATIONS**

2.1 **PRECAUTIONS**

2.1.1 An RCP (or RCP motor) should not be started if its bus is supplied from the same Reserve Auxiliary Transformer through which a Diesel Generator is paralleled to the grid. The pump starting current may trip the Diesel Generator Breaker.

2.1.2 If RHR is in the Shutdown Cooling Mode, RCS Pressure shall be less than 365 psig prior to stopping a Reactor Cooling Pump, to preclude lifting an RHR Suction Relief.

2.1.3 Since Control Room indication of RCP number one seal leakoff flow is from 0 to 6 gpm, a reading of 6 gpm should be considered to indicate greater than 6 gpm flow when evaluating RCP seal abnormalities.

2.1.4 Whenever the RCS temperature is above 160°F, at least one Reactor Coolant Pump (RCP) should be in operation, preferably pump 4 to ensure best spray flow.

2.1.5 When starting the first RCP with a bubble in the Pressurizer, the additional RCP heat input may cause an insurge of cooler RCS water into the pressurizer. Surge line temperature may be controlled by monitoring surge line temperature and adjusting RHR cooling and charging flow to ensure a net outsurge from the pressurizer.

2.1.6 With Westinghouse and Operations management approval, RCPs may be started without ACCW flow to perform 30 second and 1 minute air sweeps per 13001, "Reactor Coolant System Filling and Venting" or to verify proper rotation following electrical maintenance (less than 1 minute). General Manager approval will be required for starting RCPs without ACCW for any other operation. Operation without ACCW in service for more than 10 minutes is prohibited.

2.1.7 Seal Injection flow should be maintained to coupled RCPs when RCS level is greater than the 190 foot elevation, however, if necessary, seal injection may be secured to RCPs above the 190 foot elevation provided RCS level is maintained constant.

2.1.8 RCPs should not be uncoupled and placed on their back seat until the RCS is depressurized and vented.

2.2 **LIMITATIONS**

2.2.1 If seal injection is not in service and the reactor coolant temperature is greater than 150°F, Auxiliary Component Cooling Water shall be supplied to the thermal barrier.

2.2.2 When the reactor coolant pressure is less than 100 psig, the No. 1 Seal Leakoff Valves should be closed.

2.2.3 The RCP seal injection flow should be maintained greater than 8 gpm and less than 13 gpm any time seal injection is required.

2.2.4 With the reactor coolant temperature greater than 400°F, the seal injection temperature should be maintained less than 135°F.

2.2.5 The following primary to secondary temperature limitations apply for RCP start:

a. In order to prevent a low temperature RCS overpressure event, Technical Specification LCO 3.4.6, Note 2 requires that the secondary side water temperature of each Steam Generator Temperature be less than 50°F above each of the RCS cold leg temperatures prior to the start of an RCP any time during mode 4 operation (i.e., Tc less than or equal to 350°F). Additionally, while in Mode 4 with no other RCPs running, this differential temperature limit is reduced to 25°F at an RCS temperature of 350°F and varies linearly to 50°F at an RCS temperature of 200°F as shown in figure 3. This ensuresRHR system design pressures are not exceeded when the RHR suction reliefs are used for cold overpressure protection.

b. To ensure the above limits are not exceeded, an administrative limit, FSAR 5.2.2.10.2.c, is established such that an RCP shall not be started if its associated Steam Generator secondary water temperature is greater than 10°F above its RCS cold leg loop temperature.

2.2.6 An RCP should not be started with the reactor critical. (Ref 18005-C)

2.2.7 The following conditions for the No. 1 Seal must be established prior to RCP start:

a. 200-psid minimum differential pressure across No. 1 Seal.

b. A minimum VCT pressure of 15 psig.

c. Minimum No. 1 Seal Leakoff as obtained from Figure 2.

2.2.8 The following starting duty cycle for the RCP should be observed:

a. Only one RCP shall be started at any one time.

b. Two successive starts are permitted, provided the motor is permitted to coast to a stop between starts.

c. A third start may be made when the winding and core have cooled by running for a period of 20 minutes, or by standing idle for a period of 45 minutes.

2.2.9 During RCS filling and venting, RCS pressure must be greater than 325 psig prior to starting an RCP to ensure adequate seal D/P is maintained throughout RCS fill and vent. If necessary, the RCP should be stopped prior to seal D/P dropping less than 200 psid. If the seal D/P goes below 200 psid during pump operation or coast down, the RCP should be evaluated before restarting the RCP.

2.2.10 An RCP shall be stopped if any of the following conditions exist.

a. Motor bearing temperature exceeds 195°F.

b. Motor stator winding temperature exceeds 311°F.

c. Seal water inlet temperature exceeds 230°F

d. Total loss of ACCW for a duration of 10 minutes.

e. RCP shaft vibration of 20 mils or greater.

f. RCP frame vibration of 5 mils or greater.

g. Differential pressure across the number 1 seal of less than 200 psid.

3.0 PREREQUISITES AND INITIAL CONDITIONS

3.1 The Reactor Coolant Drain Tank is in service.

3.2 The Chemical and Volume Control System is available to supply seal flow to the RCPs.

3.3 The Volume Control Tank is in service.

4.0 **INSTRUCTIONS**

4.1 **STARTUP**

4.1.1 **Aligning an RCP for Standby**

ALIGN the RCPs for standby per 11003-1, "Reactor Coolant Pump Alignment".

4.1.2 **Starting an RCP**

NOTE

The following steps should be repeated for each RCP to be started.

CAUTION

Following outages when all RCPs have been stopped, the potential exists that low boron concentration water may have accumulated in an RCS loop. This could result in a loss of core shutdown margin if this low boron water is injected into the core.

4.1.2.1 To ensure that adequate shutdown margin will be maintained for start of an idle RCP, REFER to 12001-C or 12002-C as appropriate to determine if special procedures will be used to start the first RCP.

4.1.2.2 ENSURE the RCP has been aligned to STANDBY per 11003, "Reactor Coolant Pump Alignment".

NOTE

SGBD temperatures are preferred to SG skin temperatures when establishing conditions for starting a Reactor Coolant Pump. SG Skin temperatures should only be used if SGBD cannot be placed in service or if the SGBD temperature indication for the RCP to be started is inoperable.

4.1.2.3 INITIATE blowdown flow from the applicable Steam Generator per 13605-1, "Steam Generator Blowdown Processing System".

4.1.2.4 When SG Blowdown has been in service for at least one hour and SGBD temperatures have stabilized (rate of change less than 1°F per hour):

a. VERIFY that the Steam Generator secondary water temperature is less than or equal to 10°F above the RCS Loop Tc for the RCP to be started.

RCS Loop	SG Blowdown Temp	RCS Loop Temp
Loop 1	1-TI-1175 or 1-TI-5734	1-TI-0413B (IPC: T9883)
Loop 2	1-TI-1176 or 1-TI-5735	1-TI-0423B (IPC: T9884)
Loop 3	1-TI-1177 or 1-TI-5736	1-TI-0433B (IPC: T9885)
Loop 4	1-TI-1178 or 1-TI-5737	1-TI-0443B (IPC: T9886)

b. RECORD the measured delta-T for the RCP to be started in the Unit Control Log (or the UOP in progress).

NOTE

PERFORM the following only if SGBD cannot be placed in service or SGBD temperature instrumentation for the RCP to be started is inoperable.

4.1.2.5 If Steam Generator blowdown cannot be placed in service or any loop SGBD TI is not available:

a. MEASURE the Steam Generator metal surface temperature with a contact pyrometer (Measure skin temperature on the lower handhole or other similar location on the lower shell.)

b. VERIFY that a Steam Generator skin temperature to RCS Tc for the RCP to be started is ≤10°F.

c. RECORD the measured Temperature difference for the RCP to be started in the Control Room Log (or the UOP in progress).

d. RECORD the Pyrometer ID number in the Control Room Log.

4.1.2.6 START the RCP Oil Lift Pump for the associated RCP to be started.

4.1.2.7 If maintenance was performed on the RCP to be started or if the RCP has been shutdown for an extended outage, PERFORM the following:

a. Visual inspection of the applicable RCP by checking the following items:

(1) No visible oil leaks,

(2) Pump free from obstructions,

(3) No excess external seal leakage,

(4) The oil level in the RCP Oil Drain Tank is less than 1 inch in the sight glass to be able to collect any subsequent leakage during operation.

b. HAND-ROTATE the applicable RCP and VERIFY free rotation and proper seal parameters.

4.1.2.8 ESTABLISH the required conditions for starting an RCP as listed in Table 1.

4.1.2.9 Using the RCS Pressure-Temperature Curve in the UOPS, VERIFY the RCS conditions are acceptable for RCP operation.

4.1.2.10 VERIFY no vibration alarms for the associated RCP to be started.

CAUTION

An RCP shall not be started if its associated Steam Generator secondary water temperature is greater than 10°F above its RCS loop temperature.

4.1.2.11 ENSURE the RCP Oil Lift Pump has been running for at least two minutes.

4.1.2.12 If starting the first RCP with a bubble in the Pressurizer, perform the following to minimize Pressurizer surge line temperature changes:

a. INCREASE flow through the in-service RHR heat exchanger to establish a slightly decreasing trend in RCS temperature,

b. DECREASE charging flow to establish a slightly decreasing trend in Pressurizer level.

4.1.2.13 ENSURE personnel clear of RCP to be started.

NOTE

If an RCP (or RCP motor) will be started without ACCW cooling, per limitation 2.1.6, RCP parameters, especially, bearing temperatures should be monitored closely while the pump is running.

4.1.2.14 START the RCP by PLACING the RCP 1E Control Switch in START and then PLACING the RCP Non-1E Control Switch in Start.

RCP	1E Control Switch	Non-1E Control Switch
Loop 1	1-HS-0495A	1-HS-0495B
Loop 2	1-HS-0496A	1-HS-0496B
Loop 3	1-HS-0497A	1-HS-0497B
Loop 4	1-HS-0498A	1-HS-0498B

4.1.2.15 After the RCP has operated for at least one minute, STOP the RCP Oil Lift Pump.

4.1.2.16 ADJUST charging flow, as necessary to maintain desired Pressurizer level.

4.1.2.17 MONITOR the reactor coolant pressure, loop flow, pump vibration and pump seal parameters to verify proper pump operation.

4.2 **SYSTEM OPERATION**

4.2.1 **Pump Operation With A Seal Abnormality**

4.2.1.1 If the Plant Computer is available, TREND the computer data points listed in Table 2,

\- OR -

If the Plant Computer is not available, MONITOR the QMCB indication listed in Table 2 at least hourly for the next 8 hours. If no further seal degradation exists, the hourly frequency may be reduced as directed by the Unit Shift Supervisor (USS).

4.2.1.2 MONITOR the No. 1 seal for further degradation.

a. EVALUATE the monitored indications using Figure 1, RCP Seal Abnormalities Decision Tree. If immediate pump shutdown is required, GO to step 4.2.1.3.

b. MONITOR the following RCP Trip Criteria. If immediate pump shutdown is required, GO to step 4.2.1.3.

RCP TRIP CRITERIA	
Motor bearing temperature	>195°F
Motor stator-winding temperature	>311°F
Seal water inlet temperature	>230°F
RCP shaft vibration	≥20 mils
RCP Frame vibration	≥5 mils
#1 seal Differential Pressure	<200 psid.
Total loss of ACCW for a duration of 10 minutes	

c. As directed by Figure 1, STOP the affected RCP within 8 hours as follows:

(1) ESTABLISH 9 gpm or greater seal injection flow to the affected pump.

(2) STOP the affected RCP by continuing with step 4.2.1.3.

4.2.1.3 If required, PERFORM an immediate RCP shutdown as follows:

a. START the RCP Oil Lift Pump for affected RCP.

b. If Reactor Power is greater than 15% Rated Thermal Power:

(1) TRIP the Reactor and INITIATE 19000-C, "E-0 Reactor Trip Or Safety Injection".

(2) When the Reactor Trip has been verified, STOP the affected RCP.

c. If Reactor Power is less than 15% Rated Thermal Power, INITIATE 18005-C, "Partial Loss Of Flow", and STOP the affected RCP.

d. If RCP #1 or #4 was stopped, PLACE its associated spray valve in MANUAL and CLOSE the valve.

(1) RCP 1: 2-PIC-0455C

(2) RCP 4: 2-PIC-0455B

e. When the RCP comes to a complete stop (as indicated by reverse flow), CLOSE the RCP Seal Leakoff Isolation valve for the affected pump.

(1) RCP #1: 1-HV-8141A

(2) RCP #2: 1-HV-8141B

(3) RCP #3: 1-HV-8141C

(4) RCP #4: 1-HV-8141D

f. SECURE oil lift pump.

4.3 SHUTDOWN

4.3.1 RCP Shutdown

CAUTION

If RHR is in the Shutdown Cooling Mode, RCS Pressure shall be less than 365 psig prior to stopping a Reactor Coolant Pump (This is to preclude lifting a RHR Suction Relief).

4.3.1.1 START the RCP Oil Lift Pump for the RCP to be stopped.

CAUTION

If RCP #1 or #4 is to be stopped, the associated Spray Valve should be placed in manual and closed to prevent spray short cycling.

4.3.1.2 If RCP #1 or #4 is to be stopped, ENSURE its associated spray valve is placed in MANUAL and CLOSED:

a. RCP 1 1-PIC-0455C

b. RCP 4 1-PIC-0455B

4.3.1.3 STOP the RCP by PLACING its Non-1E Control Switch in STOP and then PLACING its 1E Control Switch in Stop.

RCP	Non-1E Control Switch	1E Control Switch
Loop 1	1-HS-0495B	1-HS-0495A
Loop 2	1-HS-0496B	1-HS-0496A
Loop 3	1-HS-0497B	1-HS-0497A
Loop 4	1-HS-0498B	1-HS-0498A

NOTE

For stopping the last RCP, allow the RCP Oil Lift Pump to run for at least 10 minutes after stopping the RCP.

4.3.1.4 When the RCP has coasted to a stop (as indicated by reverse flow), STOP the RCP Oil Lift Pump.

4.4 NON-PERIODIC OPERATION

4.4.1 Filling RCP Standpipe

NOTE

Normally the RCP Standpipes will be filled automatically by a control signal from the RCP Standpipe Level Switch.

4.4.1.1 If it is desired to manually fill the RCP Standpipe, OPEN the RCP Standpipe Level Control Valve for the appropriate standpipe to be filled.

a.	RCP 1	1-LV-0181	1-HS-0181
b.	RCP 2	1-LV-0180	1-HS-0180
c.	RCP 3	1-LV-0179	1-HS-0179
d.	RCP 4	1-LV-0178	1-HS-0178

4.4.1.2 After the RCP Standpipe Low Level Alarm has cleared, CLOSE the valve opened in the previous step.

4.4.2 **Restoring Seal Injection Flow And Coupling RCPs**

4.4.2.1 ESTABLISH the following Prerequisites:

a. The RCP(s) to be coupled is (are) electrically tagged per 00304-C.

b. RCS level less than 98% Pressurizer Cold Cal Level, (1-LI-462) and not being changed.

c. CVCS Charging is in service and that a Seal Injection flow path is available for the RCP(s) to be coupled.

d. Maintenance is standing by at the RCP(s) to be coupled with the lifting device installed and ready to lift the impeller.

4.4.2.2 ESTABLISH continuous communications with Maintenance personnel stationed at the RCP to be coupled.

4.4.2.3 SET Seal Flow Control Valve 1-HV-182 to minimum. (Only applicable for the first pump to be coupled)

CAUTION

If the seal leak-off valve for an uncoupled RCP is opened a leak path from the coupled RCPs to the CTMT sump will be established.

4.4.2.4 VERIFY RCP Seal Leakoff Isolation Valves, 1-HV-8141A, B, C, D, are closed.

CAUTION

Minimize the time between removing the impeller from its backseat and establishing seal injection flow to minimize the possibility of crud infiltration.

4.4.2.5 NOTIFY Maintenance to remove the RCP from its backseat and begin coupling.

4.4.2.6 When the RCP impeller has been lifted and coupling bolt installation commenced, ESTABLISH Seal Injection flow to the RCP as follows:

a. CLOSE the Seal Injection Line Drain Valve for the appropriate RCP. (independent verification required)

(1) RCP #1: 1-1208-U4-007 CVCS SEALS,RCP 1 SEAL, INJ WTR INL, DRN TO SUMP

(2) RCP #2: 1-1208-U4-362 CVCS SEALS,RCP 2 SEAL, INJ WTR INL, DRN TO SUMP

(3) RCP #3: 1-1208-U4-363 CVCS SEALS,RCP 3 SEAL, INJ WTR INL, DRN TO SUMP

(4) RCP #4: 1-1208-U4-364 CVCS SEALS,RCP 4 SEAL, INJ WTR INL, DRN TO SUMP

b. OPEN Seal Injection Isolation valve for the appropriate RCP, independent verification required.

(1) 1-HV-8103A RCP-1 Seal Injection Isolation

(2) 1-HV-8103B RCP-2 Seal Injection Isolation

(3) 1-HV-8103C RCP-3 Seal Injection Isolation

(4) 1-HV-8103D RCP-4 Seal Injection Isolation

c. ADJUST Seal Injection Flow Control Valve 1-HV-182 to obtain between 8-13 gpm to each of the coupled RCPs.

d. When notified by Maintenance that the RCP is coupled, ENTER in the Unit Control Log.

4.4.3 Uncoupling And Backseating RCPs And Securing Seal Injection Flow

4.4.3.1 ESTABLISH or VERIFY the following conditions:

a. The RCP(s) to be uncoupled is (are) electrically tagged per 00304-C.

b. An RCS vent path is established per 12001-C, "Unit Heatup to Hot Shutdown", (Pressurizer safety valve(s) or Pressurizer manway removed).

c. RCS level is not being changed.

d. Maintenance is standing by at the RCP(s) to be uncoupled with the lifting device installed and ready to lift the impeller.

4.4.3.2 ENSURE Seal Injection flow to each coupled RCP is between 8-13 gpm. (Maintain 8-13 gpm to each coupled RCP.)

4.4.3.3 ESTABLISH communications with Maintenance at the RCP to be backseated.

NOTE

Minimize the time between removing seal injection flow and placing the RCP on its backseat to minimize the possibility of crud infiltration into the seal.

4.4.3.4 When requested by Maintenance and just prior to lowering the impeller onto its backseat, ISOLATE Seal injection to the uncoupled RCP as follows:

a. CLOSE Seal Injection Isolation valve for the appropriate RCP, independent verification required.

(1) 1-HV-8103A RCP-1 Seal Injection Isolation

(2) 1-HV-8103B RCP-2 Seal Injection Isolation

(3) 1-HV-8103C RCP-3 Seal Injection Isolation

(4) 1-HV-8103D RCP-4 Seal Injection Isolation

b. ADJUST 1-HV-182, as necessary to maintain between 8-13 gpm to each of the coupled RCPs.

4.4.3.5 NOTIFY Maintenance that Seal Injection is isolated and to backseat the RCP.

4.4.3.6 When notified by Maintenance that the RCP is on its backseat, ENTER in the Unit Control Log.

4.4.3.7 OPEN the Seal Injection Line Drain Valve for the back seated RCP.

a. RCP #1: 1-1208-U4-007 CVCS SEALS,RCP 1 SEAL, INJ WTR INL, DRN TO SUMP

b. RCP #2: 1-1208-U4-362 CVCS SEALS,RCP 2 SEAL, INJ WTR INL, DRN TO SUMP

c. RCP #3: 1-1208-U4-363 CVCS SEALS,RCP 3 SEAL, INJ WTR INL, DRN TO SUMP

d. RCP #4: 1-1208-U4-364 CVCS SEALS,RCP 4 SEAL, INJ WTR INL, DRN TO SUMP

4.4.3.8 If desired, continue to isolate the RCP per 00304-C.

5.0 **REFERENCES**

5.1 **P&IDs**

5.1.1	1X4DB111	Reactor Coolant System
5.1.2	1X4DB112	Reactor Coolant System
5.1.3	1X4DB113	RTD Bypass Reactor Coolant System
5.1.4	1X4DB114	Chemical & Volume Control System

5.2 **ELEMENTARY DIAGRAMS**

5.2.1	1X3D-BD-B01A	Reactor Coolant Pump 1-1201-P6-001-M01
5.2.2	1X3D-BD-B01B	Reactor Coolant Pump 1-1201-P6-002-M01
5.2.3	1X3D-BD-B01C	Reactor Coolant Pump 1-1201-P6-003-M01
5.2.4	1X3D-BD-B01D	Reactor Coolant Pump 1-1201-P6-004-M01
5.2.5	1X3D-BD-B01E	RCP Oil Lift Pump 1-1201-P6-001-P01
5.2.6	1X3D-BD-B01F	RCP Oil Lift Pump 1-1201-P6-002-P01
5.2.7	1X3D-BD-B01G	RCP Oil Lift Pump 1-1201-P6-003-P01
5.2.8	1X3D-BD-B01H	RCP Oil Lift Pump 1-1201-P6-004-P01
5.2.9	1X3D-BD-B01N	Reactor Coolant Pump 1-1201-P6-001-M01
5.2.10	1X3D-BD-B01P	Reactor Coolant Pump 1-1201-P6-002-M01
5.2.11	1X3D-BD-B01X	Reactor Coolant Pump 1-1201-P6-003-M01
5.2.12	1X3D-BD-B01Y	Reactor Coolant Pump 1-1201-P6-004-M01

5.3 **ONE LINE DIAGRAMS**

5.3.1	1X3D-AA-C01A	13.8kV Switchgear 1NAA
5.3.2	1X3D-AA-C02A	13.8kV Switchgear 1NAB
5.3.3	1X3D-AA-C03A	RCP Under-Frequency & Under-Voltage Protection
5.3.4	1X3D-AA-F05A	480V MCC 1NBE
5.3.5	1X3D-AA-F06A	480V MCC 1NBF

5.4 FSAR SECTION 5.4.1

5.5 **TECHNICAL MANUAL**

1X6AB09-119 RCP Technical Manual

5.6 **PROCEDURES**

5.6.1 11003-1 "Reactor Coolant Pump Alignment"

5.6.2 13002-1 "Reactor Coolant Drain Tank Operation"

5.6.3 13006-1 "CVCS Startup and Normal Operation"

5.6.4 13007-1 "VCT Gas Control and RCS Chemical Addition"

5.6.5 13716-1 "Auxiliary Component Cooling Water System"

END OF PROCEDURE TEXT

TABLE 1 - RCP PRESTART CONDITIONS

ITEM	REQUIRED VALUE
Number 1 Seal Flow	8-13 gpm
Number 1 Seal Leakoff	Within Figure 2
Number 1 Seal DP	>200 psid
Standpipe Level - ALB08: A02-D02, A03-D03	No Alarm
Upper & Lower Oil Rsvr Lvl - ALB11: A05-D05, A06-D06	*No Alarm
ACCW Total Flow from RCP - ALB04: D02 1) Lube Oil & Motor Coolers - ALB04: A03-D03 2) Thermal Barrier Heat Exchanger - ALB04: A05-D05	 **No Alarm **No Alarm
ACCW Temperature At RCP 1) Lube Oil & Motor Coolers - ALB04: A04-D04 2) Thermal Barrier Heat Exchanger - ALB61: A01	 **No Alarm **No Alarm
VCT Pressure	>15 psig

* An RCP start is permitted at the discretion of the Unit Shift Supervisor, if the actual level is not decreasing.

** With Westinghouse and Operations management approval, RCPs may be started without ACCW flow to perform 30 second and 1 minute air sweeps per 13001, "Reactor Coolant System Filling and Venting" or to verify proper rotation following electrical maintenance (less than 1 minute). General Manager approval will be required for starting RCPs without ACCW for any other operation. RCP operation without ACCW cooling for more than 10 minutes is prohibited.

TABLE 2 - RCP SEAL PARAMETER INDICATION

PARAMETER	INSTRUMENT USED	PLANT COMPUTER POINT
RCP Seal Injection Flow 1. QMCB Indication 2. Computer Point Available	RCP 1 1-FI-0145A RCP 2 1-FI-0144A RCP 3 1-FI-0143A RCP 4 1-FI-0142A	F0131 F0129 F0127 F0125
RCP Seal Injection Temperature 1. Measured at the VCT Outlet 2. QMCB Indication 3. Computer Point Available	1-TI-0116	T0140
Number 1 Seal Differential Pressure 1. QMCB Indication	RCP 1 1-PDI-0153 RCP 2 1-PDI-0152 RCP 3 1-PDI-0151 RCP 4 1-PDI-0150	N/A
Number 1 Seal Leakoff High Flow 1. QMCB Indication 2. Computer Point Available	RCP 1 1-FI-0160A RCP 2 1-FI-0160B RCP 3 1-FI-0158A RCP 4 1-FI-0158B	F0161 F0160 F0159 F0158
Number 1 Seal Leakoff Low Flow 1. QMCB Indication Only	RCP 1 1-FI-0156A RCP 2 1-FI-0156B RCP 3 1-FI-0154A RCP 4 1-FI-0154B	N/A
Number 1 Seal Inlet Temperature 1. Computer Point Only	RCP 1 1-TE-0173 RCP 2 1-TE-0171 RCP 3 1-TE-0169 RCP 4 1-TE-0167	T0181 T0182 T0183 T0184
Number 1 Seal Inlet Temperature 1. Computer Point Only	RCP 1 1-TE-0172 RCP 2 1-TE-0170 RCP 3 1-TE-0168 RCP 4 1-TE-0166	T0417 T0437 T0457 T0477
Motor Lower Radial Bearing Temperature 1. Computer Point Only	RCP 1 1-TE-0483B RCP 2 1-TE-0484B RCP 3 1-TE-0485B RCP 4 1-TE-0486B	T0415 T0435 T0455 T0475
Motor Upper Radial Bearing Temperature 1. Computer Point Only	RCP 1 1-TE-0483A RCP 2 1-TE-0484A RCP 3 1-TE-0485A RCP 4 1-TE-0486A	T0413 T0433 T0453 T0473

TABLE 2 - RCP SEAL PARAMETER INDICATION (Cont'd)

PARAMETER	INSTRUMENT USED	PLANT COMPUTER POINT
Motor Thrust Bearing UPPER Shoe Temperature 1. Computer Point Only	RCP 1 1-TE-0479A RCP 2 1-TE-0480A RCP 3 1-TE-0481A RCP 4 1-TE-0482A	T0414 T0434 T0454 T0474
Motor Thrust Bearing Lower Shoe Temperature 1. Computer Point Only	RCP 1 1-TE-0479B RCP 2 1-TE-0480B RCP 3 1-TE-0481B RCP 4 1-TE-0482B	T0416 T0436 T0456 T0476
Motor Stator Winding Temperature 1. Computer Point Only	RCP 1 1-TE-0487 RCP 2 1-TE-0488 RCP 3 1-TE-0489 RCP 4 1-TE-0490	T0412 T0432 T0452 T0472
Vibration Proximity Probe 1. Vibration Monitor Panel	RCP 1 1-XE-0471A RCP 2 1-XE-0472A RCP 3 1-XE-0473A RCP 4 1-XE-0474A	N/A
Vibration Proximity Probe 1. Vibration Monitor Panel	RCP 1 1-XE-0471B RCP 2 1-XE-0472B RCP 3 1-XE-0473B RCP 4 1-XE-0474B	N/A
Vibration Proximity Probe 1. Vibration Monitor Panel	RCP 1 1-XE-0471C RCP 2 1-XE-0472C RCP 3 1-XE-0473C RCP 4 1-XE-0474C	N/A

FIGURE 1 - RCP SEAL ABNORMALITIES DECISION TREE

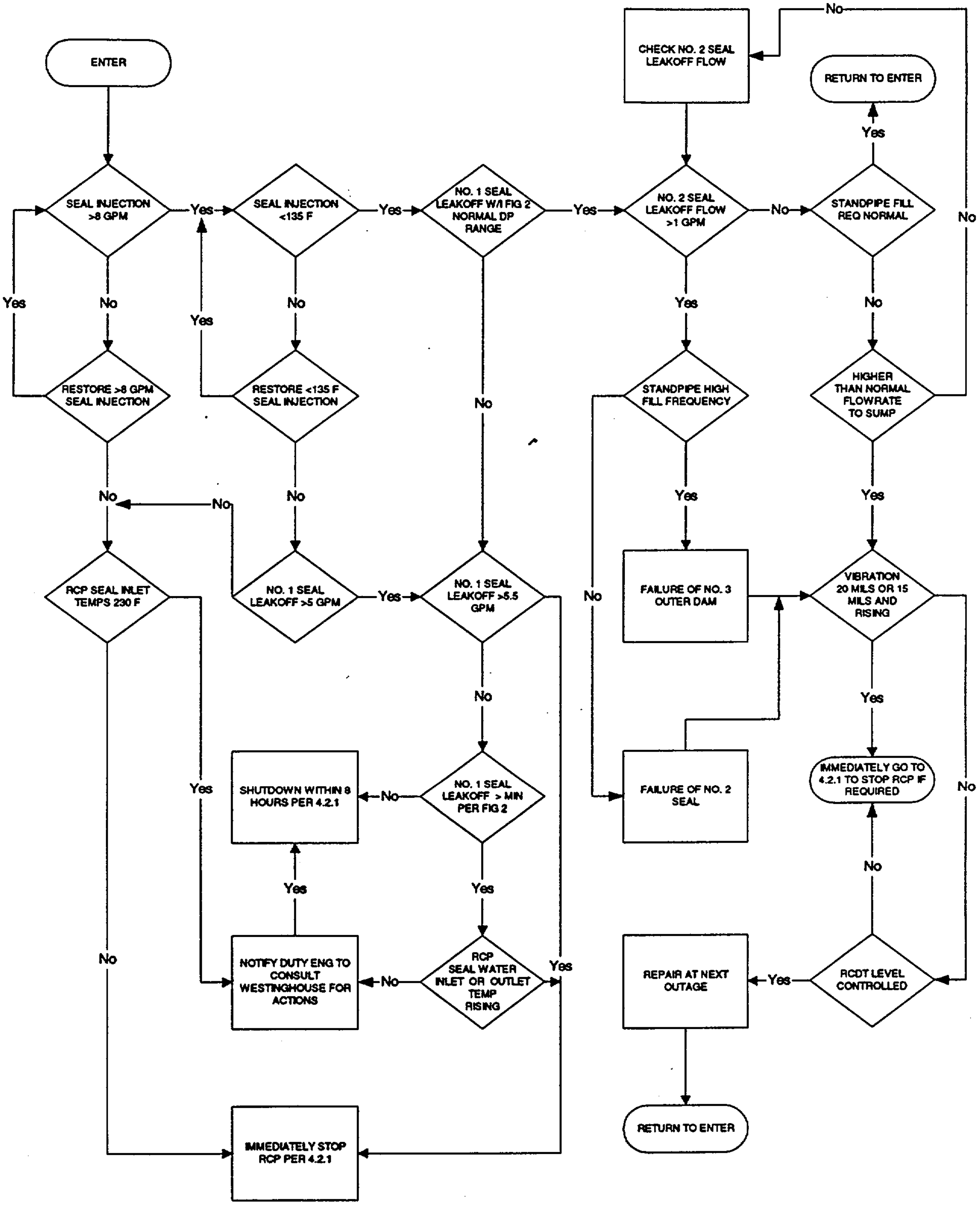


FIGURE 2

NO. 1 SEAL NORMAL OPERATING RANGE

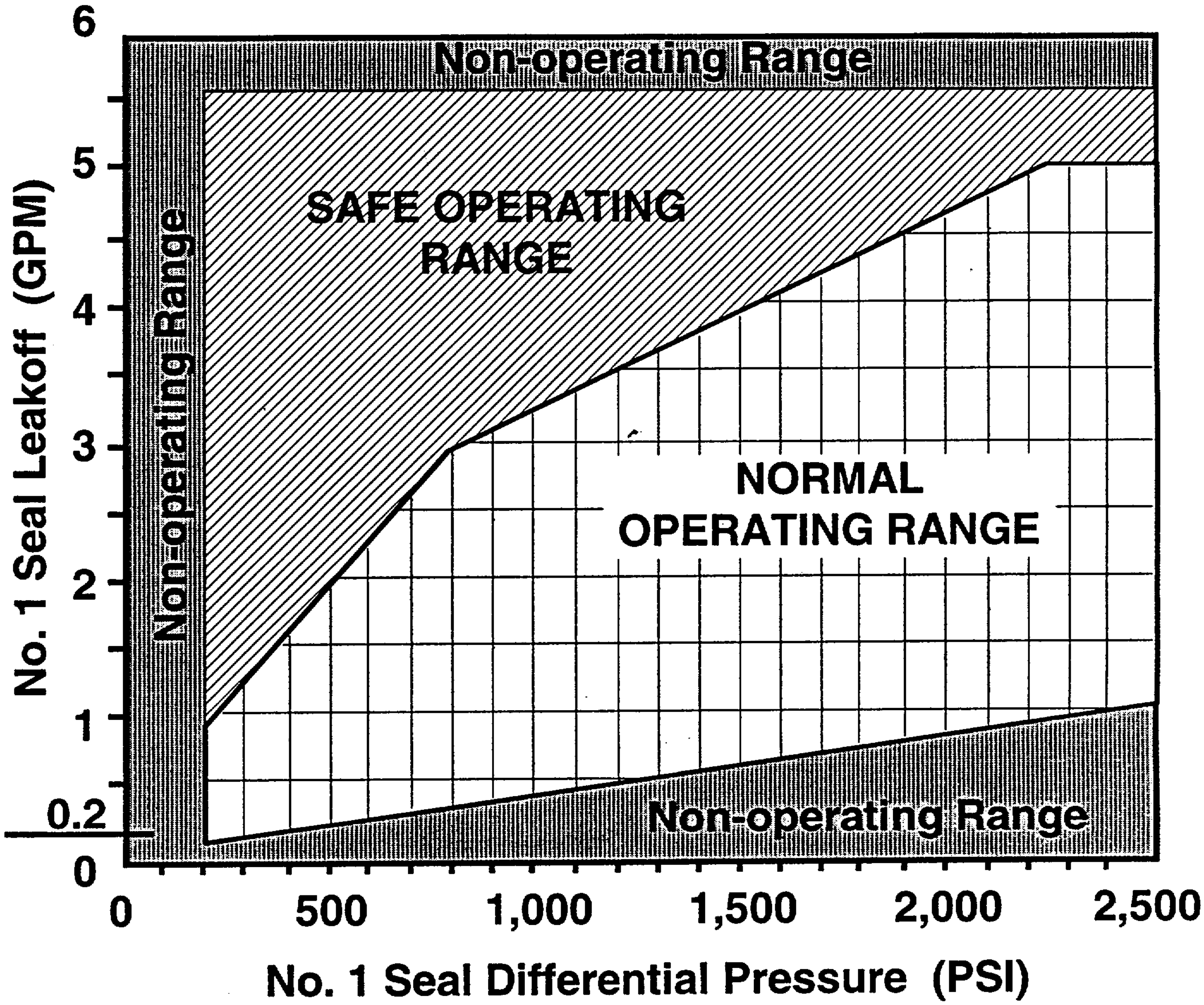
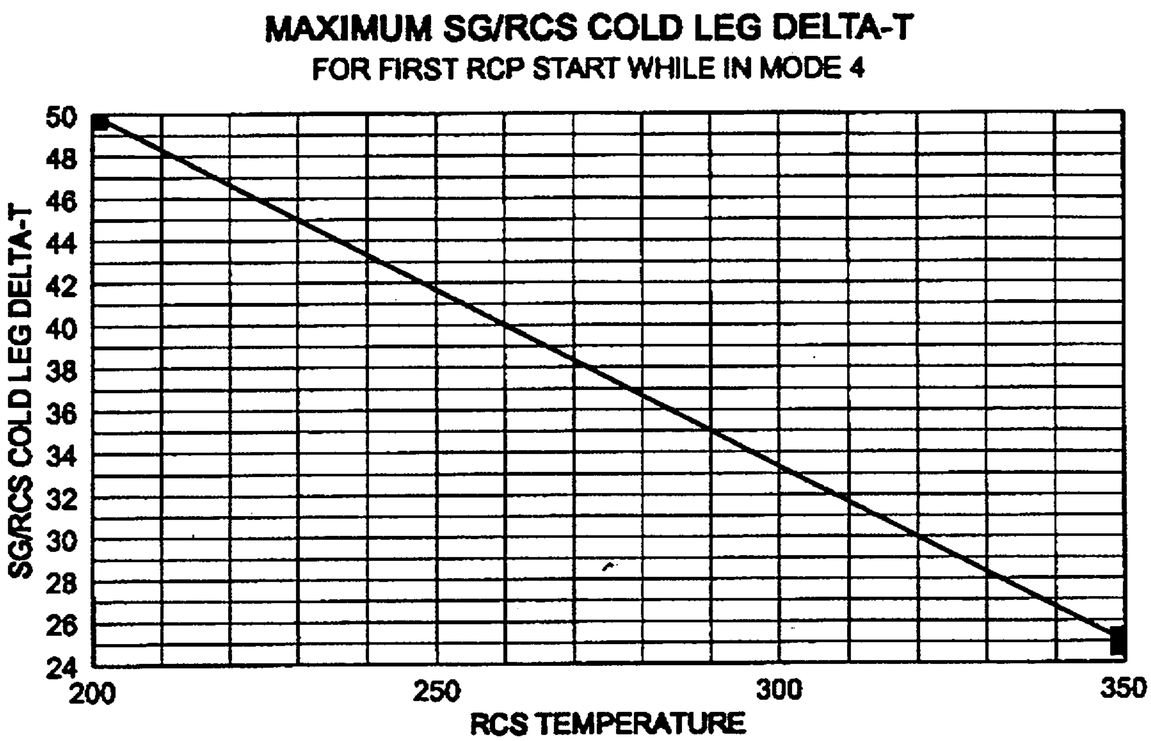


FIGURE 3



MAXIMUM SG/RCS COLD LEG DELTA-T
FOR FIRST RCP START WHILE IN MODE 4
SG/RCS COLD LEG DELTA-T
50
48
46
44
42
40
38
36
34
32
30
28
26
24
200
250
300
350
RCS TEMPERATURE

1.0 **PURPOSE**

This procedure provides instructions for performing a manual or computer generated calorimetric and then using the result of that calculation to calibrate the Power Range nuclear instrumentation channels. (TS SR 3.3.1.2)

This procedure also provides instructions for using the calculated power to periodically adjust the intermediate range nuclear instrument channels.

The sections of this procedure are:

5.1 Calorimetric Calculation When IPC Point UQ1118 Is Functional

5.2 Calorimetric Calculation when IPC Point UQ1118 Is Not Functional

DATA SHEET 1: Plant Computer Calorimetric

DATA SHEET 2: Manual Calorimetric

DATA SHEET 3: PR NI Channels N-41, 42, 43, 44 Calibration

DATA SHEET 4: Intermediate Range Channel Calibration

APPENDIX A: DAAS Data Collection Points

2.0 **APPLICABILITY**

2.1 This surveillance satisfies Technical Specification surveillance requirement, SR 3.3.1.2:

a. TS 3.3.1, Table 3.3.1-1 function 2a (Mode 1 above 15% RTP within 12 hours after exceeding 15% RTP and once per 24 hours thereafter)

b. This surveillance is performed once per 12 hours per 14000-1, "Operations Shift and Daily Surveillance Logs".

2.2 This surveillance may be used to adjust intermediate range indications when needed.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Reactor power must be stable for at least 30 minutes prior to data taking and during the subsequent calibrations.

3.2 Calibrate only one channel at a time.

3.3 This procedure shall not be performed if adjustment of other NIS channels is in progress.

3.4 The indicated reactor power shall be maintained within the limits of the operating license as described in 12004-C, "Power Operation".

3.5 The Plant Computer Calorimetric, point UQ1118, shall be considered functional whenever Control Room indication of UQ1118 and its transforms are available, i.e., CRT monitor and/or printer.

3.6 Prior to and during performance of this procedure, if the IPC is available, monitor the status of the lower plenum flow anomaly. Collect data in this procedure only when the anomaly is not present.

3.7 When this procedure is performed at reduced power, the Power Range high flux trip set points shall be adjusted as follows:

a. Below 78% power, adjust setpoint to 90%.

b. Below 28% power, adjust setpoint to 50%.

3.8 The Intermediate Range instruments have logarithmic scales that are less accurate at high power. At 100% power they read to within +10, -6 %RTP. At 64% power and lower they read to within +5, -4 %RTP.

4.0 **PREREQUISITES OR INITIAL CONDITIONS**

4.1 Tavg is within ±0.5°F of Tref.

4.2 Pressurizer Pressure, Pressurizer Level, and Steam Generator Levels are stable.

4.3 Reactor power has been stable for at least 30 minutes.

4.4 When IPC point UQ-1118 is functional, PERFORM section 5.1.

4.5 When IPC point UQ-1118 in NOT functional, PERFORM a Manual Calorimetric per Section 5.2.

5.0 **INSTRUCTIONS**

5.1 **CALORIMETRIC CALCULATION WHEN IPC POINT UQ1118 IS FUNCTIONAL**

5.1.1 Prior to and during performance of this procedure, MONITOR the status of the lower plenum flow anomaly as follows:

a. SELECT CRT Trend key, PMS trends (F6), Group 35, with Page 4 set on the fast scale (F2).

b. The Computer points monitored on the trend are N0049, N0050, N0051, N0052, UM1145 and UV0409.

c. RECORD required Calorimetric Data when the anomaly is not present.

5.1.2 PERFORM a calorimetric using either "a" or "b" below:

a. OBTAIN NIS calibration report from the Plant Computer as follows:

(1) VERIFY Tavg is within a band of ±0.5°F of Tref.

(2) VERIFY Pressurizer Pressure, Pressurizer Level and Steam Generator Levels are stable.

(3) DEPRESS the NSSS key, Primary Plant (F3), Tilt/NIS Cal (F4), Print NIS/Cal (F9).

(4) VERIFY Power Range Drawer indications agree with the Plant Computer.

b. PERFORM calorimetric per Data Sheet 1, "Plant Computer Calorimetric".

5.1.3 If any calculated Power Range channel deviation (Data Sheet 1, step 3.1) is greater than or equal to ±0.5% RTP, CALIBRATE the Power Range NI channel per Data Sheet 3.

5.1.4 If the calculated Intermediate Range channel deviations (Data sheet 1, step 3.2) exceed the following, ADJUST the Intermediate Range gains per Data Sheet 4.

a. At reactor powers between 15% and 64%, ADJUST the IR gains if the deviation is greater than ±5% RTP.

b. At reactor powers greater than 64%, ADJUST the IR gains if the deviation is greater than ±10% RTP.

5.1.5 If Rod Control was placed in manual for performance of this procedure, PLACE Rod Control System in AUTO, if desired.

5.2 **CALORIMETRIC CALCULATION WHEN IPC POINT UQ1118 IS NOT FUNCTIONAL**

5.2.1 If performing a manual calorimetric with the plant computer not available, NOTIFY I&C to install the "Data Acquisition and Analysis System (DAAS)", (or equivalent), per Appendix A to monitor feed water flow and temperature.

5.2.2 If the IPC is available, prior to and during performance of this procedure, MONITOR the status of the lower plenum flow anomaly as follows:

a. SELECT CRT Trend key, PMS trends (F6), Group 35, with Page 4 set on the fast scale (F2).

b. The Computer points monitored on the trend are N0049, N0050, N0051, N0052, UM1145 and UV0409.

c. RECORD required Calorimetric Data when the anomaly is not present.

5.2.3 Perform Data Sheet 2, "Manual Calorimetric".

5.2.4 If the calculated Power Range channel deviation (Data Sheet 2, step 6.1) is greater than or equal to ±0.5% on the indicated Power Range channels, CALIBRATE the Power Range NI channel(s) per Data Sheet 3.

5.2.5 If the calculated Intermediate Range channel deviations (Data Sheet 2, step 6.2) exceed the following, ADJUST the Intermediate Range gains per Data Sheet 4.

a. At reactor powers between 15% and 64%, ADJUST the IR gains if the deviation is greater than ±5% RTP.

b. At reactor powers greater than 64%, ADJUST the IR gains if the deviation is greater than ±10% RTP.

5.2.6 If Rod Control was placed in manual for performance of this procedure, PLACE Rod Control System in AUTO, if desired.

6.0 ACCEPTANCE CRITERIA

Power Range Channels N-41, N-42, N-43, and N-44 are within ±2% of calculated calorimetric power as required by Technical Specification SR 3.3.1.2.

7.0 EVALUATION AND REVIEW

7.1 TEST PURPOSE

[ ] Surveillance

[ ] Maintenance Retest

[ ] Other (explain) ________________________________

7.2 Results obtained through the performance of this procedure meet the ACCEPTANCE CRITERIA of Section 6.0.

[ ] YES [ ] NO

7.2.1 If NO was checked, NOTIFY USS, REFER to Technical Specification LCO 3.3.1.

7.2.2 Comments (include any abnormal conditions and corrective actions taken): ________________________________

____

____

Test Completed and USS Notified: ________________________________
Signature Date/Time

Supervisory Review: ________________________________
Signature Date/Time

8.0 REFERENCES

8.1 ASME Steam Tables

8.2 1X6AS01-154 NIS Instruction Manual

8.3 AX6AZ03-18 Gamma Metrics Neutron Flux Monitoring System

8.4 **PROCEDURES**

8.4.1 12004-C, "Power Operation"

8.4.2 14000-1, "Operation Shift And Daily Surveillance Logs"

8.4.3 14228-1, "Operations Monthly Surveillance Logs"

END OF PROCEDURE TEXT

DATA SHEET 1: PLANT COMPUTER CALORIMETRIC **INITS**

1.0 **ESTABLISH STEADY STATE CONDITIONS:**

1.1 VERIFY Tavg is within ±0.5°F of Tref. ________

1.2 VERIFY Pressurizer Pressure, Pressurizer Level and Steam Generator Levels are stable. ________

1.3 PLACE the Control Rods in MANUAL. ________

2.0 **COLLECT CALORIMETRIC DATA AND CALCULATE REACTOR POWER:**

2.1 Record average Indicated Power over a 10-minute interval, (Use Power Range readings at NI drawer 'A' full power meter):

TIME	N41	N42	N43	N44
TOTAL				
AVERAGE				

2.2 RECORD Intermediate Range Readings at Control Room signal Processors:

a. Intermediate Range Channel N35 ________%

b. Intermediate Range Channel N36 ________%

DATA SHEET 1: PLANT COMPUTER CALORIMETRIC (continued)

2.3 During full power operation, confirm validity of UQ1118 by verifying the following:

a. RCL AVG DT power (Plant Computer UV0485) less than or equal to 101.0% ______%

b. TURB FIRST STAGE PRESSURE (Plant Computer Point P0398 and P0399) less than or equal to 101%.

(1) P0398 ______%

(2) P0399 ______%

c. If any of the above values are exceeded, NOTIFY the Operations Manager.

NOTE

If Excess Letdown is in service ADD 3 MWT to the Plant Computer 30-minute average prior to entering the value here.

2.4 Record Plant Computer Calorimetric Power, UQ1131 (30-minute Average Total Thermal Power Output). ______ MWT (UQ1131)

a. If UQ1131 is greater than 3565 MWT, VERIFY that Plant Computer Calorimetric Power UQ1129 (hourly AVG) is less than or equal to 3565 MWT. ______ MWT (UQ1129)

b. If UQ1129 is greater than 3565 MWT, INITIATE 14915-1, "Special Conditions Surveillance Logs" and PERFORM "Eight-Hour Average Reactor Power Calculation" per Data Sheet 11. ______

2.5 Reactor Power (%) $= \frac{\text{(Step 2.4)}}{3565} \times 100$

$= \frac{\_\_\_\_\_\_}{3565} \times 100$

= ______ % (Rounded to <u>one</u> decimal place)

DATA SHEET 1: PLANT COMPUTER CALORIMETRIC (continued)

3.0 **DETERMINE NI CHANNEL DEVIATIONS**

Round all Deviation values to the nearest tenth (0.1)%.

3.1 Power Range Channel Deviation

	Average Step 2.1		Step 2.5		Deviation
N41 Channel Deviation =	______ %	-	______ %	=	______ %
N42 Channel Deviation =	______ %	-	______ %	=	______ %
N43 Channel Deviation =	______ %	-	______ %	=	______ %
N44 Channel Deviation =	______ %	-	______ %	=	______ %

3.2 Intermediate Range Channel Deviation

	Step 2.2		Step 2.5		Deviation
N35 Channel Deviation =	______ %	-	______ %	=	______ %
N36 Channel Deviation =	______ %	-	______ %	=	______ %

3.3 RETURN to Procedure step 5.1.3.

DATA SHEET 2: MANUAL CALORIMETRIC

1.0 **ESTABLISH STEADY STATE CONDITIONS:** **INITS**

1.1 VERIFY Tavg is within ±0.5°F of Tref. ________

1.2 VERIFY Pressurizer Pressure, Pressurizer Level and Steam Generator Levels are stable. ________

1.3 PLACE the Control Rods in MANUAL. ________

1.4 If performing a manual calorimetric using the Data Acquisition and Analysis System (DAAS) (or equivalent):

a. RECORD equipment data below:

M&TE	ID NUMBER	CAL DUE DATE
________	________	________

b. ENSURE the DAAS computer clock matches the Control Room Clock. ________

2.0 **COLLECT CALORIMETRIC DATA AND CALCULATE REACTOR POWER:**

Use the plant computer when available for obtaining the following data; if the IPC is not available, use indications in ( ).

2.1 Time ________ Date ________

2.2 Average Steam Pressure (See Note 1)

SG 001	P0400	(PI-0514)	________	PSIG
	P0401	(PI-0515)	________	PSIG
	P0402	(PI-0516)	________	PSIG
SG 002	P0420	(PI-0524)	________	PSIG
	P0421	(PI-0525)	________	PSIG
	P0422	(PI-0526)	________	PSIG
SG 003	P0440	(PI-0534)	________	PSIG
	P0441	(PI-0535)	________	PSIG
	P0442	(PI-0536)	________	PSIG
SG 004	P0460	(PI-0544)	________	PSIG
	P0461	(PI-0545)	________	PSIG
	P0462	(PI-0546)	________	PSIG
		Total =	________	PSIG
		Average Steam Pressure =	________	PSIG

DATA SHEET 2: MANUAL CALORIMETRIC (Continued)

2.3 Average FW Inlet Temperature (See Notes 1 and 3)

SG 001	T0418	(TY-15208) (or TY-15204)	________	°F
SG 002	T0438	(TY-15209) (or TY-15205)	________	°F
SG 003	T0458	(TY-15210) (or TY-15206)	________	°F
SG 004	T0478	(TY-15211) (or TY-15207)	________	°F
		Total =	________	°F
		Average FW Inlet Temperature =	________	°F

2.4 Total FW Flow (See Notes 2 and 3)

SG 001	F0403	(FY-510B)	________	MPPH
	F0404	(FY-511B)	________	MPPH
SG 002	F0423	(FY-520B)	________	MPPH
	F0424	(FY-521B)	________	MPPH
SG 003	F0443	(FY-530B)	________	MPPH
	F0444	(FY-531B)	________	MPPH
SG 004	F0463	(FY-540B)	________	MPPH
	F0464	(FY-541B)	________	MPPH
		Sum =	________	MPPH
		Total FW Flow = Sum/2 =	________	MPPH

(If using Plant Computer Points, divide sum by 1000 to convert to MPPH.)

2.5 Blowdown Flow (Enter zero if secured) (See Note 4)

SG 001	F0407	(FI-1171B)	________	GPM
SG 002	F0427	(FI-1172B)	________	GPM
SG 003	F0447	(FI-1173B)	________	GPM
SG 004	F0467	(FI-1174B)	________	GPM
		Total =	________	GPM

DATA SHEET 2: MANUAL CALORIMETRIC (continued)

2.6 Indicated Power Range Power (A Drawer)

Power Range N41 ________ %

Power Range N42 ________ %

Power Range N43 ________ %

Power Range N44 ________ %

2.7 Indicated Intermediate Range Power (Control Room Signal Processors)

Intermediate Range N35 ________ %

Intermediate Range N36 ________ %

NOTE 1: If a data point is not acceptable (e.g., value abnormally high or low, indicator bad, total loss of indication), enter "Bad" for the value. Calculate the "Total" based on the remaining values and obtain the "Average" by dividing the "Total" by the number of remaining values.

NOTE 2: If a data point is not acceptable (e.g., value abnormally high or low, indicator bad, total loss of indication), record the indicated value of its redundant data point for that loop in its place.

NOTE 3: Obtain FW Inlet Temperature and FW Flow when the plant computer is not available by reading a single sample from the DAAS at a time consistent with other data.

NOTE 4: If blowdown indication is lost, enter 0 gpm for the applicable loop. This is the default value used in UQ1118.

DATA SHEET 2: MANUAL CALORIMETRIC (continued)

3.0 Using the steam tables, CALCULATE the following data:

3.1 Average Steam Enthalpy = ______________ BTU/lbm
(Use Average Steam Pressure +14.7 and Saturated Steam Tables, quality factor of 1)

3.2 Average FW Enthalpy = ____________ BTU/lbm
(Use Average FW Temperature and Average Steam Pressure +14.7 and Subcooled Tables)

3.3 Average Blowdown Enthalpy = _____________ BTU/lbm
(Use Average Steam Pressure +14.7 and Saturated Liquid Enthalpy at this pressure, quality factor of 0)

3.4 Average Feedwater Specific Volume = _____________ ft^3/lbm
(Use Average FW Temperature and 1000 psia and Subcooled Tables from PTDB.)

4.0 Determine the temperature corrected FW Flow:

4.1

$$\text{Correction Factor} = \left\{1 + 0.98 \times 10^{-5}\left[(\text{Step 2.3}) - 440\right]\right\}^2 \sqrt{\frac{0.01917}{\text{Step 3.4}}}$$

$$= \left\{1 + 0.98 \times 10^{-5}\left[\_\_\_\_\_\_\_\_ - 440\right]\right\}^2 \sqrt{\frac{0.01917}{\_\_\_\_\_\_\_\_}}$$

$= \_\_\_\_\_\_\_\_\_\_\_\_$ (5 decimal places)

4.2

Corrected FW Flow = (Step 2.4) × (Step 4.1)

= (________) × (________)

= __________ MPPH

DATA SHEET 2: MANUAL CALORIMETRIC (continued)

5.0 Determine the total reactor thermal power:

5.1

$$Q = \begin{pmatrix}\text{Step } 4.2\\ \text{MPPH}\end{pmatrix} \times \left[\begin{pmatrix}\text{Step } 3.1\\ \text{Btu/ lbm}\end{pmatrix} - \begin{pmatrix}\text{Step } 3.2\\ \text{Btu/ lbm}\end{pmatrix}\right]$$

$$- \begin{pmatrix}\text{Step } 2.5\\ \text{gpm}\end{pmatrix} \times \left[\begin{pmatrix}\text{Step } 3.1\\ \text{Btu/ lbm}\end{pmatrix} - \begin{pmatrix}\text{Step } 3.3\\ \text{Btu/ lbm}\end{pmatrix}\right] \times \frac{495.12 \text{ MPPH}}{10^6 \text{ gpm}}$$

$$- 55.29^* \text{ MBTU / Hr}$$

$$= (\_\_\_\_\_\_\_\_) \times \_\_\_\_\_\_\_\_ - \_\_\_\_\_\_\_\_$$

$$- (\_\_\_\_\_\_\_\_) \times \_\_\_\_\_\_\_\_ - \_\_\_\_\_\_\_\_ \times \frac{495.12}{10^6}$$

$$- 55.29$$

$$= \_\_\_\_\_\_\_\_ - \_\_\_\_\_\_\_\_ - 55.29$$

$$= \_\_\_\_\_\_\_\_ \text{ MBTU / Hr}$$

*Net RCS heat input - losses determined during post core load hot functional testing.

DATA SHEET 2: MANUAL CALORIMETRIC (continued)

5.2 Reactor Thermal Power Determination:

5.2.1 Manual Calorimetric:

$$\text{Reactor Power} = \frac{\text{(Step 5.1)}}{3.413} \text{ MWT}$$

$$= \frac{\_\_\_\_\_\_\_\_}{3.413} \text{ MWT}$$

$$= \_\_\_\_\_\_\_\_ \text{ MWT}$$

5.2.2 If Step 5.2.1 is greater than 3565 MWT, immediately notify the USS or SS.

5.3

$$\text{Reactor Power (\%)} = \frac{\text{(Step 5.2.1)}}{3565} \times 100$$

NOTE

If Excess Letdown is in service ADD 3 MWT to this value prior to entering.

$$= \frac{\_\_\_\_\_\_\_\_}{3565} \times 100$$

= ________ % (Rounded to one decimal place)

5.4 If Step 5.3 is greater than 100.0% of rated power, INITIATE 14915-1, "Special Conditions Surveillance Logs" and PERFORM "Eight-Hour Average Reactor Power Calculation" per Data Sheet 11.

DATA SHEET 2: MANUAL CALORIMETRIC (continued)

6.0 **DETERMINE NI CHANNEL DEVIATIONS**

Round all Deviation values to the nearest tenth (0.1)%.

6.1 Power Range Channel Deviation

	Step 2.6	-	Step 5.3	=	Deviation
N41 Channel Deviation =	______ %	-	______ %	=	______ %
N42 Channel Deviation =	______ %	-	______ %	=	______ %
N43 Channel Deviation =	______ %	-	______ %	=	______ %
N44 Channel Deviation =	______ %	-	______ %	=	______ %

6.2 Intermediate Range Channel Deviation

	Step 2.7	-	Step 5.3	=	Deviation
N35 Channel Deviation =	______ %	-	______ %	=	______ %
N36 Channel Deviation =	______ %	-	______ %	=	______ %

6.3 Return to Procedure step 5.2.4.

DATA SHEET 3: PR NI CHANNELS N-41, 42, 43, 44 CALIBRATION

INITIALS
N41/N42/N43/N44

1.0 The Unit Shift Supervisor (USS) shall ensure this calibration does not affect other tests presently in progress or jeopardize plant operation prior to granting approval to perform this task.

____
USS APPROVAL

1.1 PLACE the Rod Control System in Manual __________

NOTE

N/A Channel(s) not calibrated.

1.2 At PR NI Channel Power Range A drawers, record indicated power level.

______ N41 ______ N42 ______ N43 ______ N44 % Pwr

1.3 Obtain and record the following information from Data Sheet 1 or Data Sheet 2: ___/___/___/___

a. Reactor Power (NIS calibration report [30 Min Ave Thermal Power (%)] or Data Sheet 1, Step 2.5 or Data Sheet 2, Step 5.3) ________%

b. NI Channel Deviation (NIS calibration report or Data Sheet 1, Step 3.1 or Data Sheet 2, Step 6.1)

______ N41 ______ N42 ______ N43 ______ N44

1.4 BYPASS the power range channel to be calibrated as follows:

a. At the Comparator and Rate Drawer, SELECT the COMPARATOR CHANNEL DEFEAT switch to the channel to be calibrated position. ___/___/___/___

b. At the Detector Current Comparator Drawer, SELECT the following switches to the channel to be calibrated:

(1) UPPER SECTION switch ___/___/___/___

(2) LOWER SECTION switch ___/___/___/___

(3) ROD STOP BYPASS switch ___/___/___/___

(4) POWER MISMATCH BYPASS switch ___/___/___/___

DATA SHEET 3: PR NI CHANNELS N-41, 42, 43, 44 CALIBRATION

INITIALS N41/N42/N43/N44

1.5 At the PR Channel to be calibrated, CHECK the fine gain potentiometer reading between 1.0 and 9.0. ___/___/___/___

If the fine GAIN potentiometer reading is less than 1.0 or greater than 9.0, notify USS and (at his discretion) direct I&C to adjust the fine GAIN potentiometer to 5.0 as follows (otherwise mark these steps N/A):

a. Slowly slide Drawer B out to access COARSE adjust potentiometer. ___/___/___/___

b. Unlock fine GAIN potentiometer. ___/___/___/___

c. Monitor indicated power range % power at Drawer A. ___/___/___/___

CAUTIONS

Use extreme caution when adjusting the 'Coarse level' potentiometer (R312). R312 adjustments should be made very slowly.

Maintain indicated power constant by adjusting fine GAIN potentiometer as required to prevent "tripping" channel bistables. Any POS. RATE bistables should be reset immediately.

d. Simultaneously adjust the COARSE level potentiometer (R312) and the fine GAIN potentiometer at Drawer B as required to obtain a fine GAIN potentiometer setting of approximately 5.0. ___/___/___/___

e. Maintain indicated power range % power constant during adjustment. ___/___/___/___

f. Lock fine GAIN potentiometer and return Drawer B to NORMAL position. ___/___/___/___

1.6 At the PR channel 'B' Drawer, UNLOCK and ADJUST the Fine GAIN potentiometer to correct the Power Range 'A' drawer indicated power by the value obtained in Step 1.3b.

For a negative (-) deviation, increase the power indication. For a positive (+) deviation, decrease the power indication. ___/___/___/___

DATA SHEET 3: PR NI CHANNELS N-41, 42, 43, 44 CALIBRATION

INITIALS
N41/N42/N43/N44

1.7 Lock and record the new GAIN potentiometer setting.

_____ N41 _____ N42 _____ N43 _____ N44 ___/___/___/___

1.8 At the Power Range A drawers, record indicated power level.

_____ N41 _____ N42 _____ N43 _____ N44 % Pwr ___/___/___/___

1.9 Return PR Channel calibrated to service as follows:

a. At the Detector Current Comparator Drawer, RETURN the following switches to OPERATE:

(1) ROD STOP BYPASS switch ___/___/___/___

___/___/___/___
IV

(2) POWER MISMATCH BYPASS switch ___/___/___/___

___/___/___/___
IV

(3) UPPER SECTION switch ___/___/___/___

___/___/___/___
IV

(4) LOWER SECTION switch ___/___/___/___

___/___/___/___
IV

b. At the Comparator and Rate Drawer SELECT the COMPARATOR CHANNEL DEFEAT switch to NORMAL position. ___/___/___/___

___/___/___/___
IV

1.10 ENSURE there are no unexpected alarms or tripped bistables associated with the PR Channel calibrated. ___/___/___/___

1.11 RETURN to step 5.1.4 or 5.2.5 (as applicable) when all channel calibrations are complete.

DATA SHEET 4: INTERMEDIATE RANGE CHANNEL CALIBRATION **INITIALS**

1.0 The Unit Shift Supervisor (USS) shall ensure this calibration will not affect other tests presently in progress or jeopardize plant operation prior to granting approval to perform this task.

_______________ USS APPROVAL

1.1 PLACE the Rod Control System in Manual _______________

1.2 RECORD reactor power, (NIS calibration report [30 Min Ave Thermal Power (%)] or Data Sheet 1, Step 2.5 or Data Sheet 2, Step 5.3): ______% POWER

1.3 At the control room IR Signal Processors, ADJUST Intermediate Range Gains as follows:

a. Intermediate Range N35

(1) UNLOCK and ADJUST the N35 GAIN potentiometer until N35 indicates the power recorded in step 1.2 above. __________

(2) LOCK and RECORD the new gain potentiometer setting:

IR N35 Gain Setting: ________ __________

b. Intermediate Range N36

(1) UNLOCK and ADJUST the N36 GAIN potentiometer until N36 indicates the power recorded in step 1.2 above. __________

(2) LOCK and RECORD the new gain potentiometer setting:

IR N36 Gain Setting: ________ __________

1.4 At DPU-B N32/N36 Signal Processor (CB 230):

a. UNLOCK and ADJUST the N36 GAIN potentiometer to the same gain setting as IR channel N36 in the control room, (Step 1.3.b (2) above). __________

b. LOCK and RECORD the new gain potentiometer setting:

DPU-B IR N36 Gain Setting: ________ __________

1.5 RETURN to step 5.1.5 or 5.2.6 (as applicable) when all channel calibrations are complete.

Sheet 1 of 1

APPENDIX A

DAAS DATA COLLECTION POINTS

Analog Signal List: Manual Calorimetric

Chan	Description	Plant Tag	Scale Minimum	Scale Maximum	Eng. Units	Alarm Min.	Alarm Max.	Volts Min.	Volts Max.	Connection Point
1	S/G #1 TY-15208	TY-15208	300.000	450.000	DEG F	0.000	10.000	0.000	10.000	QBCP-0521
2	S/G #1 TY-15204	TY-15204	300.000	450.000	DEG F	0.000	10.000	0.000	10.000	QBCP-0522
3	S/G #2 TY-15209	TY-15209	300.000	450.000	DEG F	0.000	10.000	0.000	10.000	QBCP-0525
4	S/G #2 TY-15205	TY-15205	300.000	450.000	DEG F	0.000	10.000	0.000	10.000	QBCP-0526
5	S/G #3 TY-15210	TY-15210	300.000	450.000	DEG F	0.000	10.000	0.000	10.000	QBCP-0529
6	S/G #3 TY-15206	TY-15206	300.000	450.000	DEG F	0.000	10.000	0.000	10.000	QBCP-0530
7	S/G #4 TY-15211	TY-15211	300.000	450.000	DEG F	0.000	10.000	0.000	10.000	QBCP-0533
8	S/G #4 TY-15207	TY-15207	300.000	450.000	DEG F	0.000	10.000	0.000	10.000	QBCP-0534
17	Loop #1 FY-0510B	FY-0510B	0.000	4.800	MPPH	0.000	10.000	0.000	10.000	QPC1-0644
18	Loop #1 FY-0511B	FY-0511B	0.000	4.800	MPPH	0.000	10.000	0.000	10.000	QPC1-0648
19	Loop #2 FY-0520B	FY-0520B	0.000	4.800	MPPH	0.000	10.000	0.000	10.000	QPC2-0544
20	Loop #2 FY-0521B	FY-0521B	0.000	4.800	MPPH	0.000	10.000	0.000	10.000	QPC2-0548
21	Loop #3 FY-0530B	FY-0530B	0.000	4.800	MPPH	0.000	10.000	0.000	10.000	QPC3-0344
22	Loop #3 FY-0531B	FY-0531B	0.000	4.800	MPPH	0.000	10.000	0.000	10.000	QPC3-0348
23	Loop #4 FY-0540B	FY-0540B	0.000	4.800	MPPH	0.000	10.000	0.000	10.000	QPC4-0547
24	Loop #4 FY-0541B	FY-0541B	0.000	4.800	MPPH	0.000	10.000	0.000	10.000	QPC4-0551

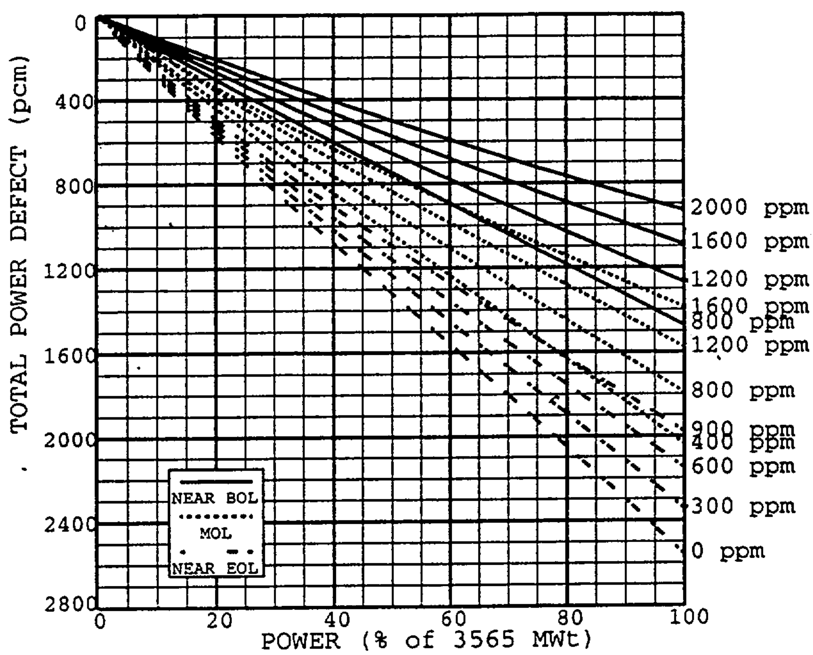
REACTIVITY CURVES

CYCLE 9

[signature] 12/19/99
Reviewed By Date

REACTIVITY CURVES

TAB 1.1.1-F1
POWER DEFECT FOR
ESTIMATED CRITICAL CONDITIONS
CYCLE 9



Near BOL (2000 MWD/MTU)		MOL (11000 MWD/MTU)		Near EOL (17000 MWD/MTU)		EOL (21800 MWD/MTU)	
Boron (ppm)	Defect (pcm)	Boron (ppm)	Defect (pcm)	Boron (ppm)	Defect (pcm)	Boron (ppm)	Defect (pcm)
2000	965	1600	1358	900	1946	900	2146
1900	999	1500	1395	800	1997	800	2195
1800	1033	1400	1434	700	2050	700	2246
1700	1068	1300	1476	600	2105	600	2299
1600	1105	1200	1520	500	2163	500	2355
1500	1144	1100	1567	400	2223	400	2413
1400	1183	1000	1615	300	2286	300	2475
1300	1224	900	1666	200	2351	200	2539
1200	1267	800	1719	100	2419	100	2606
1100	1311	700	1774	0	2490	0	2677
1000	1357	600	1830				
900	1404	500	1888				
800	1453	400	1947				

Near BOL Burnup Range ≤ 2000 MWD/MTU
MOL Burnup Range > 2000 MWD/MTU and ≤ 11000 MWD/MTU
Near EOL Burnup Range > 11000 MWD/MTU and ≤ 17000 MWD/MTU
EOL Burnup Range > 17000 MWD/MTU

Phillip L. Gray 2/19/99
Reviewed By Date

REACTIVITY CURVES

TAB 1.1.2-T1
POWER DEFECT FOR SHUTDOWN MARGIN
CYCLE 9

Power Defect (pcm) for Shutdown Margin Calculations

Burnup Range (MWD/MTU)	Power Level (%) 0	10	20	30	40	50	60	70	80	90	100
≤ 150	0	387	582	714	845	1001	1156	1240	1323	1416	1509
> 150≤ 1000	0	379	573	707	841	993	1144	1237	1330	1415	1500
> 1000≤ 2000	0	361	550	682	814	966	1118	1202	1285	1373	1460
> 2000≤ 3000	0	348	534	667	799	945	1091	1172	1253	1351	1449
> 3000≤ 4000	0	359	550	687	824	968	1111	1199	1287	1379	1471
> 4000≤ 5000	0	378	578	720	862	1003	1144	1236	1328	1426	1523
> 5000≤ 6000	0	399	612	761	910	1045	1180	1283	1386	1489	1593
> 6000≤ 7000	0	421	646	802	958	1087	1216	1330	1444	1553	1662
> 7000≤ 8000	0	444	682	846	1010	1135	1260	1382	1504	1620	1735
> 8000≤ 9000	0	468	718	890	1062	1183	1303	1434	1564	1686	1808
> 9000≤10000	0	491	749	931	1114	1235	1357	1496	1634	1765	1895
>10000≤11000	0	514	780	973	1165	1288	1411	1558	1704	1843	1982
>11000≤12000	0	537	813	1016	1220	1341	1462	1622	1782	1930	2079
>12000≤13000	0	559	847	1060	1274	1394	1514	1687	1860	2017	2175
>13000≤14000	0	582	880	1104	1329	1447	1565	1751	1937	2104	2272
>14000≤15000	0	604	913	1148	1383	1500	1616	1816	2015	2192	2368
>15000≤16000	0	626	943	1190	1437	1558	1680	1891	2103	2287	2471
>16000≤17000	0	649	973	1232	1490	1617	1744	1967	2190	2382	2574
>17000≤18000	0	669	1002	1271	1539	1671	1803	2038	2274	2481	2688
>18000≤19000	0	690	1031	1310	1588	1725	1862	2110	2357	2579	2801
>19000≤20000	0	710	1061	1350	1639	1779	1918	2181	2443	2673	2904
>20000≤21000	0	730	1091	1390	1689	1832	1975	2252	2528	2767	3006
>21000≤21800	0	746	1115	1423	1730	1875	2020	2309	2597	2843	3088
>21800≤23000	0	746	1115	1423	1730	1875	2020	2309	2597	2843	3088

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REACTIVITY CURVES

TAB 1.3.1-T1
INTEGRAL BORON BOL
(BURNUP ≤ 6500 MWD/MTU)
CYCLE 9

Vessel Average Moderator Temperature (°F)

Boron (ppm)	ARI 68	ARI 100	ARI 150	ARI 200	ARI 250	ARI 300	ARI 350	ARI 400	ARI 450	ARI 500	ARI 550	ARI 557	ARO 557	ARO 586.4
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
200	2496	2460	2405	2350	2291	2225	2150	2063	1959	1838	1695	1673	1780	1669
400	4915	4845	4739	4632	4517	4389	4243	4072	3871	3634	3355	3313	3521	3301
600	7261	7159	7005	6849	6682	6495	6281	6031	5737	5389	4981	4918	5224	4900
800	9537	9405	9206	9003	8787	8545	8267	7942	7558	7105	6572	6490	6890	6466
1000	11745	11586	11344	11098	10835	10541	10202	9805	9337	8783	8131	8031	8520	8000
1200	13891	13705	13423	13136	12829	12485	12089	11624	11074	10424	9657	9540	10115	9502
1400	15975	15764	15445	15120	14771	14380	13929	13400	12772	12030	11152	11018	11677	10975
1600	18002	17768	17412	17051	16663	16229	15726	15134	14433	13601	12617	12466	13205	12419
1800	19974	19717	19328	18933	18509	18032	17480	16829	16057	15139	14053	13886	14702	13835
2000	21895	21617	21196	20769	20310	19793	19195	18487	17646	16646	15460	15278	16169	15225
2200	23768	23469	23017	22560	22068	21515	20871	20110	19202	18122	16839	16642	17605	16589
2400	25595	25277	24796	24310	23787	23198	22512	21698	20727	19569	18192	17980	19014	17929
2600	27381	27043	26534	26020	25468	24845	24119	23255	22223	20988	19518	19292	20395	19245

INTEGRAL BORON WORTH (PCM) VERSUS BORON CONCENTRATION AND AVERAGE VESSEL TEMPERATURE

NO XENON OR SAMARIUM

BOL (BURNUP ≤ 6500 MWD/MTU)

Reviewed By 2/19/99
Date

REACTIVITY CURVES

TAB 1.3.1-T2
INTEGRAL BORON MOL
(6500 < BURNUP ≤ 14000 MWD/MTU)
CYCLE 9

Boron (ppm)	Vessel Average Moderator Temperature (°F) ARI												ARO	
	68	100	150	200	250	300	350	400	450	500	550	557	557	586.4
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
200	2686	2646	2585	2524	2459	2386	2305	2210	2099	1969	1817	1794	1899	1779
400	5284	5207	5091	4972	4845	4704	4544	4359	4142	3889	3592	3547	3754	3520
600	7798	7688	7519	7346	7161	6956	6722	6450	6133	5762	5327	5261	5566	5223
800	10233	10091	9873	9650	9411	9145	8841	8488	8074	7590	7023	6936	7335	6890
1000	12592	12420	12157	11887	11597	11274	10904	10473	9967	9374	8680	8574	9064	8523
1200	14878	14678	14373	14059	13722	13345	12912	12408	11815	11118	10300	10175	10753	10121
1400	17094	16869	16523	16169	15788	15361	14870	14295	13618	12821	11884	11741	12404	11687
1600	19246	18996	18613	18221	17799	17325	16778	16137	15380	14486	13434	13272	14018	13222
1800	21335	21061	20644	20217	19756	19239	18640	17935	17101	16114	14949	14770	15596	14727
2000	23366	23070	22619	22159	21663	21105	20457	19693	18785	17707	16431	16236	17140	16203
2200	25343	25024	24542	24051	23523	22927	22234	21412	20433	19267	17882	17669	18650	17652
2400	27268	26928	26415	25896	25338	24708	23971	23095	22048	20794	19302	19072	20128	19073
2600	29146	28784	28243	27697	27111	26448	25672	24745	23630	22292	20693	20446	21575	20470

INTEGRAL BORON WORTH (PCM) VERSUS BORON CONCENTRATION AND AVERAGE VESSEL TEMPERATURE

NO XENON OR SAMARIUM

MOL (6500 < BURNUP ≤ 14000 MWD/MTU)

Reviewed By ______ 2/19/99 Date

REACTIVITY CURVES

TAB 1.3.1-T3
INTEGRAL BORON EOL
(BURNUP > 14000 MWD/MTU)
CYCLE 9

Vessel Average Moderator Temperature (°F)

Boron (ppm)	ARI 68	100	150	200	250	300	350	400	450	500	550	557	ARO 557	586.4
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
200	2955	2913	2845	2775	2699	2615	2521	2414	2292	2152	1993	1968	2064	1945
400	5804	5722	5592	5456	5310	5149	4967	4759	4522	4249	3935	3888	4077	3844
600	8550	8431	8245	8049	7839	7605	7341	7038	6691	6291	5830	5760	6041	5700
800	11199	11047	10808	10558	10287	9987	9645	9254	8802	8280	7678	7587	7957	7513
1000	13756	13573	13285	12985	12660	12297	11884	11408	10858	10219	9481	9369	9828	9286
1200	16225	16013	15681	15335	14960	14539	14059	13505	12860	12110	11240	11107	11654	11019
1400	18611	18372	18000	17612	17190	16717	16175	15545	14811	13953	12955	12803	13439	12714
1600	20919	20656	20245	19818	19354	18833	18232	17533	16713	15752	14630	14458	15183	14373
1800	23155	22867	22421	21959	21456	20890	20236	19470	18568	17507	16263	16073	16889	15997
2000	25322	25011	24532	24037	23499	22892	22188	21359	20379	19221	17858	17649	18558	17588
2200	27426	27092	26582	26057	25487	24842	24091	23203	22148	20896	19415	19188	20192	19146
2400	29471	29115	28574	28021	27422	26743	25948	25004	23877	22532	20935	20690	21793	20674
2600	31462	31084	30514	29935	29309	28598	27763	26766	25568	24133	22420	22156	23362	22173

INTEGRAL BORON WORTH (PCM) VERSUS BORON CONCENTRATION AND AVERAGE VESSEL TEMPERATURE

NO XENON OR SAMARIUM

EOL (BURNUP > 14000 MWD/MTU)

Phillip L. Gayer / 2/19/99
Reviewed By Date

REACTIVITY CURVES

TAB 1.3.2
CRITICAL BORON WITH ARI-1
CYCLE 9

Burnup (MWD/MTU)	Vessel Average Moderator Temperature (°F) 68	200	300	400	500	557
0	1435	1426	1419	1396	1324	1242
1000	1428	1412	1405	1386	1317	1234
2000	1421	1400	1392	1376	1309	1225
3000	1412	1387	1380	1365	1300	1214
4000	1402	1376	1367	1353	1288	1200
5000	1390	1363	1354	1340	1274	1184
6000	1377	1350	1340	1325	1257	1165
7000	1361	1335	1324	1308	1238	1142
8000	1342	1319	1306	1288	1215	1116
9000	1321	1300	1286	1265	1188	1086
10000	1297	1279	1262	1238	1157	1051
11000	1269	1254	1235	1208	1122	1012
12000	1238	1225	1205	1173	1082	969
13000	1202	1192	1169	1134	1037	920
14000	1163	1154	1129	1089	986	865
15000	1118	1111	1083	1039	930	805
16000	1069	1062	1031	983	868	739
17000	1015	1006	973	921	800	666
18000	956	944	908	852	725	586
19000	891	875	836	775	643	500
20000	820	797	756	691	553	406
21000	742	712	667	600	456	304
21800	676	637	590	520	373	218
23000	568	514	463	390	238	77

Conditions: CZP - HZP
ARI-1
No Xenon, No Samarium

Note: Boron Concentrations include between 100 and 230 ppm additional boron to address uncertainties and B^{10} depletion.

CRITICAL BORON CONCENTRATION (PPM) FOR ARI MINUS THE MOST REACTIVE STUCK ROD VERSUS CYCLE BURNUP AND AVERAGE VESSEL TEMPERATURE

Reviewed By: Phillip L. Copp / Date: 2/19/99

REACTIVITY CURVES

TAB 1.3.3
BORON CORRECTION FACTOR
CYCLE 9

WORTH OF XE & SM	BORON CORRECTION FACTOR
0	1.00000
500	1.00652
1000	1.01303
1,500	1.01955
2,000	1.02606
2,500	1.03258
3,000	1.03909
3,500	1.04561
4,000	1.05212
4,500	1.05864
5,000	1.06515
5,500	1.07167
6,000	1.07818
6,500	1.08470
7,000	1.09121
7,500	1.09773
8,000	1.10424
8,500	1.11076
9,000	1.11727
9,500	1.12379
10,000	1.13030

$$\text{Boron Correction Factor} = 1 + \frac{(0.1303) \times (\text{Xe} + \text{Sm Worth})}{10{,}000}$$

CORRECTION FACTOR DUE TO XENON AND SAMARIUM EFFECTS ON BORON

Reviewed By / 2/19/99 Date

REACTIVITY CURVES

TAB 1.3.4-T1
REQUIRED BORON FOR SDM
MODES 3 AND 4
CYCLE 9

Required Boron Concentration (ppm) for Shutdown Margin as a Function of Temperature and Burnup for Modes 3 and 4
Mode 4 (at least 1 RCP) & Mode 3

Burnup (MWD/MTU)	Vessel Average Moderator Temperature (°F) 200	300	400	500	557
0	1638	1641	1631	1568	1488
1000	1620	1622	1615	1556	1474
2000	1603	1603	1599	1543	1458
3000	1585	1584	1582	1526	1440
4000	1568	1565	1563	1507	1418
5000	1549	1545	1542	1485	1393
6000	1530	1524	1520	1460	1364
7000	1509	1501	1494	1432	1332
8000	1486	1476	1467	1400	1297
9000	1460	1448	1436	1364	1257
10000	1432	1418	1401	1325	1214
11000	1401	1384	1363	1281	1166
12000	1365	1346	1321	1233	1114
13000	1326	1305	1275	1181	1057
14000	1282	1258	1224	1123	996
15000	1233	1207	1168	1061	930
16000	1179	1150	1106	994	859
17000	1119	1088	1039	921	782
18000	1053	1019	966	842	700
19000	980	943	886	758	613
20000	900	860	800	667	520
21000	813	770	707	571	421
21800	737	692	627	489	337
23000	614	565	499	358	204

Conditions: Mode 3 and 4
ARI-1
No Xenon, No Samarium

Note: Boron Concentrations include between 100 ppm and 230 ppm additional boron to address uncertainties and B^{10} depletion.

Reviewed By Date 12/19/99

REACTIVITY CURVES

TAB 1.3.4-T2
REQUIRED BORON FOR SDM
MODES 4 & 5
CYCLE 9

Required Boron Concentration (ppm) for Shutdown Margin as a Function of Temperature and Burnup for Modes 4 and 5

Mode 4 (no RCP) & Mode 5

Burnup (MWD/MTU)	Vessel Average Moderator Temperature (°F) 68	100	200	300	350
0	1768	1769	1776	1783	1786
1000	1761	1760	1760	1764	1765
2000	1752	1749	1744	1744	1746
3000	1741	1736	1727	1725	1726
4000	1726	1721	1709	1705	1705
5000	1709	1703	1690	1684	1684
6000	1688	1682	1669	1661	1660
7000	1663	1658	1645	1637	1634
8000	1635	1631	1619	1610	1606
9000	1603	1600	1589	1579	1574
10000	1568	1565	1556	1545	1539
11000	1528	1526	1518	1507	1499
12000	1483	1482	1477	1464	1455
13000	1435	1434	1430	1416	1405
14000	1381	1382	1378	1363	1350
15000	1323	1324	1320	1303	1288
16000	1259	1261	1256	1236	1219
17000	1191	1192	1186	1163	1144
18000	1116	1117	1108	1081	1060
19000	1037	1036	1023	992	968
20000	951	949	931	893	867
21000	860	855	830	786	757
21800	783	776	743	693	661
23000	659	647	601	541	506

Conditions: Mode 4 and 5
ARI-1
No Xenon, No Samarium

Note: Boron Concentrations include between 100 ppm and 230 ppm additional boron to address uncertainties and B^{10} depletion.

William 2. Copp 2/19/99
Reviewed By Date

REACTIVITY CURVES

TAB 1.3.5
CRITICAL BORON WITH
CONTROL BANKS INSERTED
CYCLE 9

Critical Boron Concentration (ppm) as a Function of Temperature and Burnup with Control Banks Only Inserted

Burnup (MWD/MTU)	Vessel Average Moderator Temperature (°F) 68	100	200	300	400	500	557
0	1658	1657	1650	1645	1633	1586	1526
1000	1682	1682	1677	1674	1667	1624	1566
2000	1699	1699	1695	1695	1691	1652	1593
3000	1709	1709	1707	1709	1707	1668	1609
4000	1712	1713	1711	1714	1713	1675	1614
5000	1709	1710	1709	1712	1711	1672	1609
6000	1699	1701	1700	1703	1701	1660	1594
7000	1684	1686	1685	1686	1683	1639	1570
8000	1663	1665	1664	1664	1658	1610	1538
9000	1636	1639	1637	1635	1627	1574	1497
10000	1604	1607	1604	1600	1588	1530	1449
11000	1567	1571	1566	1559	1544	1480	1394
12000	1525	1529	1523	1513	1494	1424	1333
13000	1479	1482	1475	1462	1439	1362	1266
14000	1428	1431	1423	1407	1378	1295	1193
15000	1373	1376	1366	1346	1314	1224	1116
16000	1314	1317	1304	1282	1245	1148	1035
17000	1252	1254	1239	1214	1172	1068	951
18000	1186	1187	1171	1143	1096	986	863
19000	1116	1117	1099	1068	1017	900	773
20000	1044	1044	1023	990	936	813	681
21000	969	968	945	910	853	724	587
21800	907	905	881	844	784	652	512
23000	811	807	781	743	681	542	399

Conditions: CZP - HZP
Control Banks Only Inserted
No Xenon, No Samarium

Note: Boron Concentrations include between 100 ppm and 230 ppm additional boron to address uncertainties and B^{10} depletion.

Reviewed By 2/19/99
Date

REACTIVITY CURVES

TAB 1.3.6
CRITICAL BORON WITH ALL RODS OUT
CYCLE 9

Critical Boron Concentration (ppm) as a Function of Temperature and Burnup with All Rods Out

Burnup (MWD/MTU)	Vessel Average Moderator Temperature (°F) 68	100	200	300	400	500	557
0							1752*
1000	1868	1871	1889	1917	1950	1975	1979
2000	1883	1886	1905	1935	1970	1996	2001
3000	1890	1894	1914	1944	1981	2008	2011
4000	1891	1896	1916	1946	1983	2010	2011
5000	1885	1890	1910	1941	1977	2002	2001
6000	1873	1879	1899	1928	1963	1986	1981
7000	1855	1861	1881	1909	1942	1961	1953
8000	1831	1838	1857	1883	1913	1928	1916
9000	1802	1809	1827	1851	1878	1888	1871
10000	1768	1775	1792	1813	1837	1841	1819
11000	1728	1735	1751	1769	1789	1788	1761
12000	1683	1691	1705	1720	1736	1728	1696
13000	1634	1642	1655	1667	1678	1663	1625
14000	1581	1588	1599	1608	1615	1593	1549
15000	1524	1531	1540	1546	1547	1518	1469
16000	1462	1469	1476	1479	1476	1440	1384
17000	1397	1404	1409	1408	1401	1357	1296
18000	1329	1335	1338	1334	1322	1272	1205
19000	1257	1263	1264	1257	1241	1183	1111
20000	1183	1187	1186	1178	1157	1093	1015
21000	1106	1109	1106	1095	1071	1001	918
21800	1043	1045	1040	1028	1001	926	840
23000	945	945	937	924	894	813	721

Conditions: CZP - HZP
ARO
No Xenon, No Samarium

Note: Boron Concentrations include between 100 ppm and 230 ppm additional boron to address uncertainties and B^{10} depletion.

* Value at 0 MWD/MTU is taken from Table 4-4 of the Nuclear Design Report. It does not include additional boron to address uncertainties and B^{10} depletion.

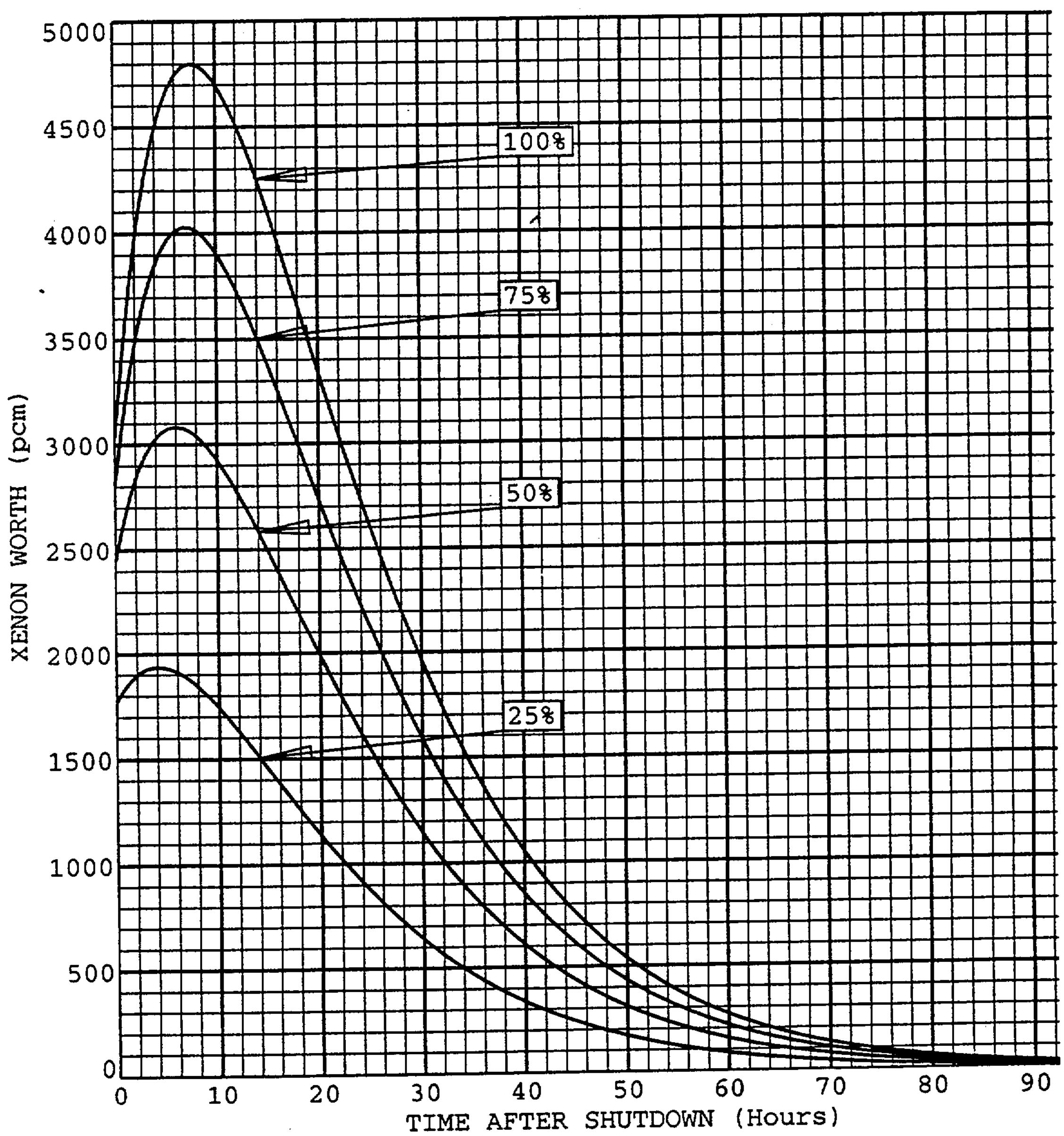
Reviewed By ________ 12/19/99
Date

REACTIVITY CURVES

TAB 1.4.1-F1
XENON AFTER SHUTDOWN (BOL)
CYCLE 9

Boron-Free Xenon Worth versus Time Following Plant Trip After Steady State Operation at BOL

(Applicable for Burnups ≤ 6500 MWD/MTU)



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Date

REACTIVITY CURVES

TAB 1.4.1-T1
XENON AFTER SHUTDOWN (BOL)
CYCLE 9

Boron-Free Xenon Worth versus Time Following Plant Trip After Steady State Operation at BOL (Applicable for Burnups ≤ 6500 MWD/MTU)

Power Level (%)	Time (Hours) 0	2	4	6	8	9	10	12	14	16	18	20	25	30
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	568	567	552	526	494	476	458	421	384	348	314	281	211	155
10	981	998	984	948	897	868	837	774	708	644	582	523	394	290
15	1301	1348	1344	1306	1244	1207	1167	1083	995	907	822	740	559	413
20	1559	1643	1658	1623	1556	1514	1467	1366	1259	1151	1045	943	715	530
25	1772	1899	1937	1911	1842	1796	1744	1630	1506	1380	1255	1134	862	641
30	1937	2113	2179	2166	2099	2051	1996	1871	1734	1592	1450	1313	1001	746
35	2101	2327	2421	2421	2357	2307	2249	2113	1962	1804	1646	1492	1140	850
40	2217	2496	2624	2642	2584	2534	2474	2331	2169	1998	1826	1657	1269	948
45	2332	2666	2827	2863	2811	2761	2699	2549	2376	2192	2006	1822	1398	1046
50	2448	2836	3030	3084	3038	2988	2925	2768	2584	2387	2185	1987	1527	1144
55	2532	2977	3206	3280	3243	3194	3130	2967	2775	2566	2352	2140	1648	1236
60	2616	3117	3382	3476	3447	3399	3335	3167	2965	2746	2519	2294	1769	1327
65	2681	3239	3540	3655	3636	3591	3526	3354	3145	2915	2677	2439	1883	1415
70	2746	3361	3699	3834	3826	3782	3717	3542	3324	3084	2834	2584	1998	1502
75	2810	3483	3857	4014	4015	3973	3908	3729	3504	3253	2992	2729	2113	1590
80	2861	3589	3998	4176	4187	4147	4083	3901	3669	3409	3137	2864	2219	1671
85	2911	3694	4139	4338	4360	4321	4258	4072	3834	3565	3283	2998	2325	1752
90	2953	3783	4259	4475	4506	4469	4406	4218	3974	3698	3406	3112	2415	1821
95	2994	3872	4378	4612	4652	4617	4554	4364	4114	3830	3530	3226	2505	1890
100	3036	3960	4497	4750	4798	4765	4702	4510	4255	3963	3654	3340	2596	1959

Power Level (%)	Time (Hours) 35	40	45	50	55	60	65	70	75	80	85	90	95	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	112	80	57	40	28	20	14	10	7	5	3	2	2	1
10	211	152	108	76	54	38	26	18	13	9	6	4	3	2
15	301	217	155	109	77	54	38	26	18	13	9	6	4	3
20	387	279	199	141	99	70	49	34	23	16	11	8	5	4
25	468	338	242	171	121	85	59	41	29	20	14	9	6	4
30	546	394	282	200	141	99	69	48	33	23	16	11	8	5
35	623	451	323	229	162	113	79	55	38	27	18	13	9	6
40	696	504	361	256	181	127	89	62	43	30	21	14	10	7
45	768	556	399	284	200	141	98	68	48	33	23	16	11	7
50	841	609	437	311	219	154	108	75	52	36	25	17	12	8
55	909	659	473	336	238	167	117	81	57	39	27	19	13	9
60	977	709	509	362	256	180	126	88	61	42	29	20	14	10
65	1042	757	543	387	273	192	134	94	65	45	31	22	15	10
70	1107	804	578	411	291	205	143	100	69	48	33	23	16	11
75	1172	852	612	436	308	217	152	106	74	51	35	24	17	12
80	1233	896	644	459	325	228	160	111	77	54	37	26	18	12
85	1293	940	676	482	341	240	168	117	81	56	39	27	19	13
90	1345	978	703	501	355	249	175	122	85	59	41	28	19	13
95	1396	1016	730	521	368	259	182	127	88	61	42	29	20	14
100	1447	1053	758	540	382	269	188	131	91	63	44	30	21	14

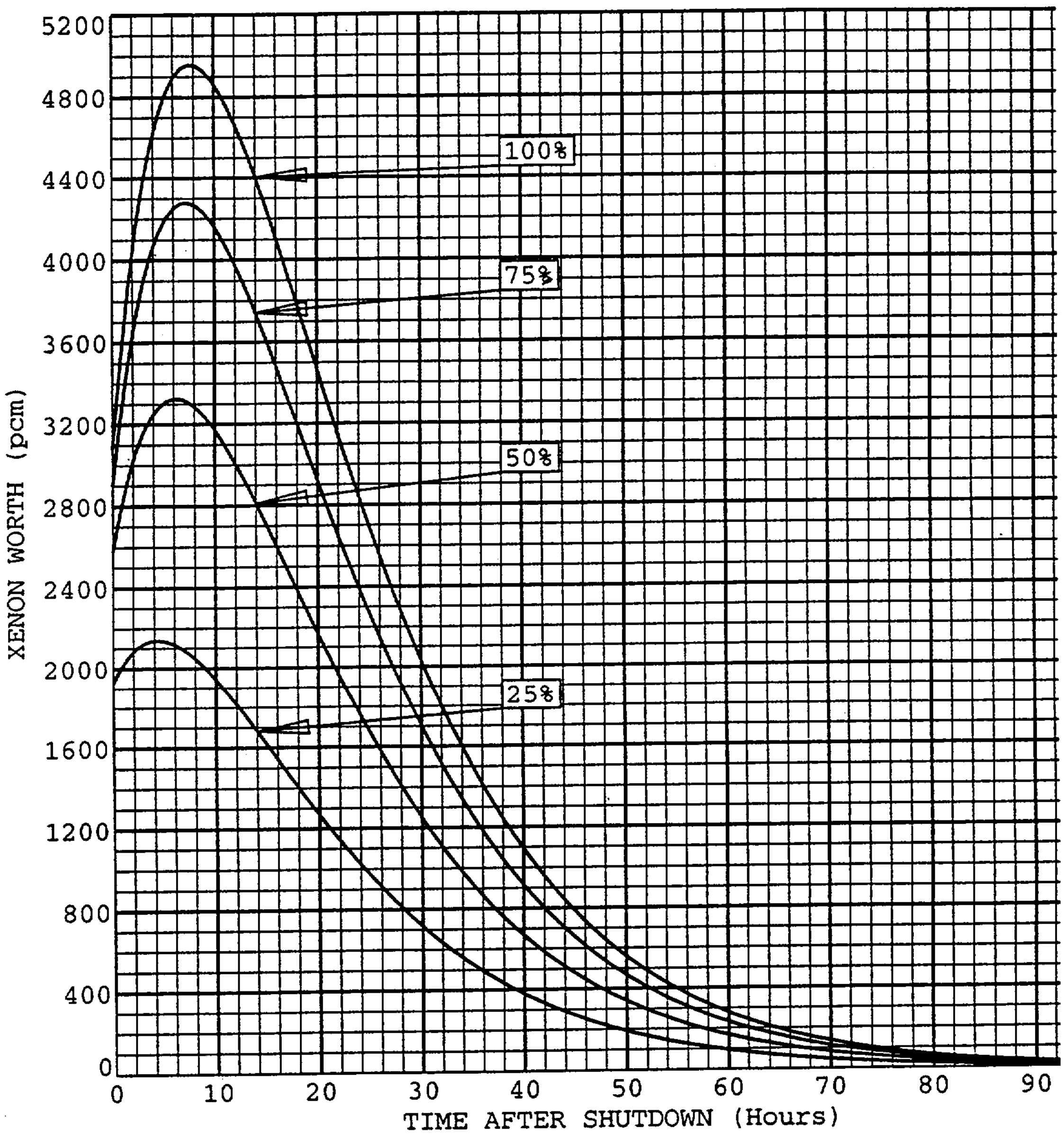
UNITS IN PCM

Reviewed By: Phillip D. App / Date: 2/19/99

REACTIVITY CURVES

TAB 1.4.1-F2
XENON AFTER SHUTDOWN (MOL)
CYCLE 9

Boron-Free Xenon Worth versus Time Following
Plant Trip After Steady State Operation at MOL
(Applicable for Burnups > 6500 and ≤14000 MWD/MTU)



Reviewed By Phillip 2 Copp 12/19/99
Date

REACTIVITY CURVES

TAB 1.4.1-T2
XENON AFTER SHUTDOWN (MOL)
CYCLE 9

Boron-Free Xenon Worth versus Time Following
Plant Trip After Steady State Operation at MOL
(Applicable for Burnups > 6500 and ≤14000 MWD/MTU)

Power Level (%)	Time (Hours) 0	2	4	6	8	9	10	12	14	16	18	20	25	30
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	682	685	668	638	600	580	558	514	469	425	383	344	258	190
10	1128	1156	1145	1106	1049	1016	981	908	833	758	685	617	465	343
15	1463	1527	1530	1491	1424	1383	1339	1244	1144	1044	947	853	646	478
20	1718	1826	1852	1820	1749	1703	1653	1541	1422	1302	1183	1068	811	602
25	1930	2086	2139	2118	2046	1997	1942	1817	1681	1542	1403	1269	966	719
30	2092	2303	2388	2384	2316	2266	2207	2072	1922	1767	1611	1459	1114	831
35	2254	2520	2638	2649	2586	2534	2472	2327	2163	1991	1818	1649	1262	942
40	2362	2688	2843	2875	2819	2768	2705	2553	2379	2194	2006	1822	1397	1045
45	2470	2856	3049	3100	3053	3003	2938	2780	2594	2396	2194	1994	1533	1148
50	2578	3024	3254	3326	3287	3237	3171	3006	2810	2598	2381	2167	1668	1250
55	2654	3163	3431	3526	3497	3449	3383	3213	3009	2785	2555	2327	1794	1347
60	2731	3301	3609	3726	3708	3661	3595	3420	3207	2972	2730	2487	1921	1443
65	2787	3416	3762	3902	3894	3850	3784	3606	3385	3141	2887	2632	2035	1530
70	2844	3532	3916	4078	4081	4038	3973	3792	3564	3309	3044	2777	2150	1618
75	2901	3648	4069	4253	4267	4227	4162	3977	3742	3478	3201	2922	2264	1705
80	2941	3740	4195	4399	4423	4385	4321	4134	3893	3620	3334	3045	2362	1780
85	2981	3832	4321	4545	4579	4543	4480	4290	4043	3763	3467	3168	2459	1854
90	3015	3907	4423	4662	4704	4670	4607	4415	4164	3877	3573	3266	2537	1913
95	3049	3982	4524	4780	4829	4797	4734	4541	4284	3991	3680	3364	2615	1973
100	3083	4057	4626	4897	4955	4924	4861	4666	4405	4105	3786	3463	2692	2032

Power Level (%)	Time (Hours) 35	40	45	50	55	60	65	70	75	80	85	90	95	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	138	99	70	50	35	24	17	12	8	6	4	3	2	1
10	249	179	128	90	64	45	31	22	15	10	7	5	3	2
15	348	251	179	127	89	63	44	30	21	15	10	7	5	3
20	439	317	226	160	113	79	55	39	27	19	13	9	6	4
25	526	380	271	193	136	95	67	46	32	22	15	11	7	5
30	608	440	315	223	158	111	77	54	37	26	18	12	9	6
35	691	500	358	254	179	126	88	61	43	30	20	14	10	7
40	767	556	398	283	200	140	98	68	47	33	23	16	11	7
45	844	611	438	312	220	155	108	75	52	36	25	17	12	8
50	920	667	479	340	240	169	118	82	57	40	27	19	13	9
55	991	719	516	367	260	183	128	89	62	43	30	20	14	10
60	1063	772	554	394	279	196	137	96	66	46	32	22	15	10
65	1128	820	589	419	296	208	146	102	71	49	34	23	16	11
70	1193	867	623	444	314	221	155	108	75	52	36	25	17	12
75	1258	915	658	468	331	233	163	114	79	55	38	26	18	12
80	1314	956	687	489	346	244	171	119	83	57	40	27	19	13
85	1369	996	716	511	361	254	178	124	86	60	41	29	20	14
90	1414	1029	740	527	373	263	184	128	89	62	43	30	20	14
95	1458	1061	763	544	385	271	190	132	92	64	44	31	21	14
100	1502	1094	787	561	397	279	196	137	95	66	46	31	22	15

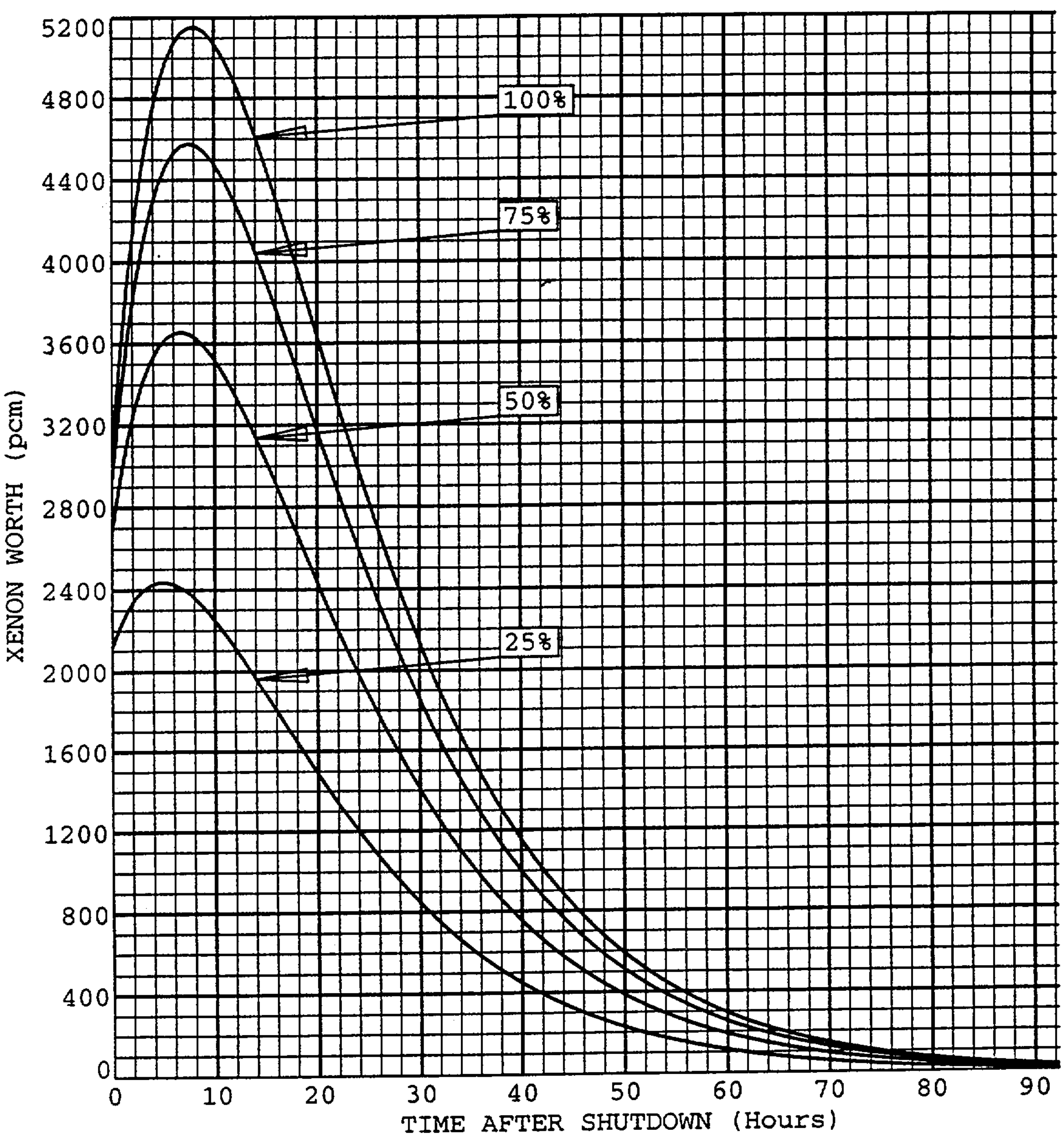
UNITS IN PCM

Reviewed By 12/19/99 Date

REACTIVITY CURVES

TAB 1.4.1-F3
XENON AFTER SHUTDOWN (EOL)
CYCLE 9

Boron-Free Xenon Worth versus Time Following Plant Trip After Steady State Operation at EOL (Applicable for Burnups > 14000 MWD/MTU)



Reviewed By Phillip L. Cyr Date 12/19/99

REACTIVITY CURVES

TAB 1.4.1-T3
XENON AFTER SHUTDOWN (EOL)
CYCLE 9

Boron-Free Xenon Worth versus Time Following Plant Trip After Steady State Operation at EOL (Applicable for Burnups > 14000 MWD/MTU)

Power Level (%)	Time (Hours) 0	2	4	6	8	9	10	12	14	16	18	20	25	30
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	850	860	844	811	765	740	713	658	602	547	493	443	333	245
10	1335	1384	1382	1343	1280	1242	1201	1115	1025	934	846	763	576	426
15	1669	1770	1793	1760	1690	1646	1596	1488	1373	1256	1141	1030	782	580
20	1927	2086	2141	2121	2051	2002	1947	1822	1686	1547	1408	1274	970	722
25	2120	2339	2429	2427	2360	2309	2250	2113	1961	1803	1644	1490	1138	848
30	2265	2551	2681	2700	2640	2590	2528	2382	2217	2042	1866	1693	1297	969
35	2411	2763	2933	2973	2921	2870	2806	2651	2472	2281	2087	1896	1456	1089
40	2503	2922	3135	3199	3158	3108	3044	2883	2694	2490	2281	2075	1597	1197
45	2595	3081	3337	3425	3394	3346	3282	3115	2916	2699	2476	2254	1737	1304
50	2687	3241	3539	3651	3631	3585	3520	3348	3138	2908	2670	2433	1878	1411
55	2750	3372	3714	3852	3845	3801	3736	3561	3343	3101	2850	2599	2010	1511
60	2813	3503	3889	4053	4058	4017	3953	3773	3547	3295	3031	2766	2141	1612
65	2856	3604	4027	4213	4230	4191	4127	3946	3713	3452	3177	2901	2249	1694
70	2899	3704	4165	4373	4401	4364	4302	4118	3879	3608	3324	3036	2356	1776
75	2942	3805	4303	4533	4572	4538	4476	4290	4044	3765	3470	3172	2463	1858
80	2973	3884	4413	4663	4711	4679	4619	4430	4180	3894	3590	3282	2551	1925
85	3004	3963	4524	4792	4850	4821	4761	4570	4315	4022	3710	3393	2639	1992
90	3026	4020	4604	4886	4951	4923	4864	4672	4414	4115	3797	3474	2703	2041
95	3048	4077	4684	4980	5052	5026	4967	4774	4512	4208	3884	3554	2767	2090
100	3070	4135	4764	5074	5153	5128	5070	4876	4610	4301	3971	3635	2830	2139

Power Level (%)	Time (Hours) 35	40	45	50	55	60	65	70	75	80	85	90	95	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	178	128	91	64	45	32	22	15	11	7	5	4	2	2
10	310	223	159	113	79	56	39	27	19	13	9	6	4	3
15	423	305	218	155	109	76	53	37	26	18	12	8	6	4
20	528	381	273	193	136	96	67	47	32	22	15	11	7	5
25	622	449	322	228	161	113	79	55	38	26	18	13	9	6
30	711	515	369	262	185	130	91	63	44	30	21	15	10	7
35	800	580	415	295	209	146	102	71	50	34	24	16	11	8
40	880	638	458	325	230	162	113	79	55	38	26	18	12	9
45	960	696	500	355	251	177	124	86	60	41	29	20	14	9
50	1039	754	542	386	273	192	134	93	65	45	31	22	15	10
55	1114	809	581	414	293	206	144	100	70	48	33	23	16	11
60	1189	864	621	442	313	220	154	107	75	52	36	25	17	12
65	1250	909	653	465	329	232	162	113	79	55	38	26	18	12
70	1311	954	686	489	346	243	170	119	83	57	40	27	19	13
75	1372	998	718	512	362	255	178	124	87	60	42	29	20	14
80	1423	1035	745	531	376	264	185	129	90	62	43	30	21	14
85	1473	1072	771	550	389	274	192	134	93	65	45	31	21	15
90	1509	1099	791	564	399	281	197	137	95	66	46	32	22	15
95	1546	1126	810	578	409	288	202	141	98	68	47	32	22	15
100	1582	1152	829	592	419	295	206	144	100	70	48	33	23	16

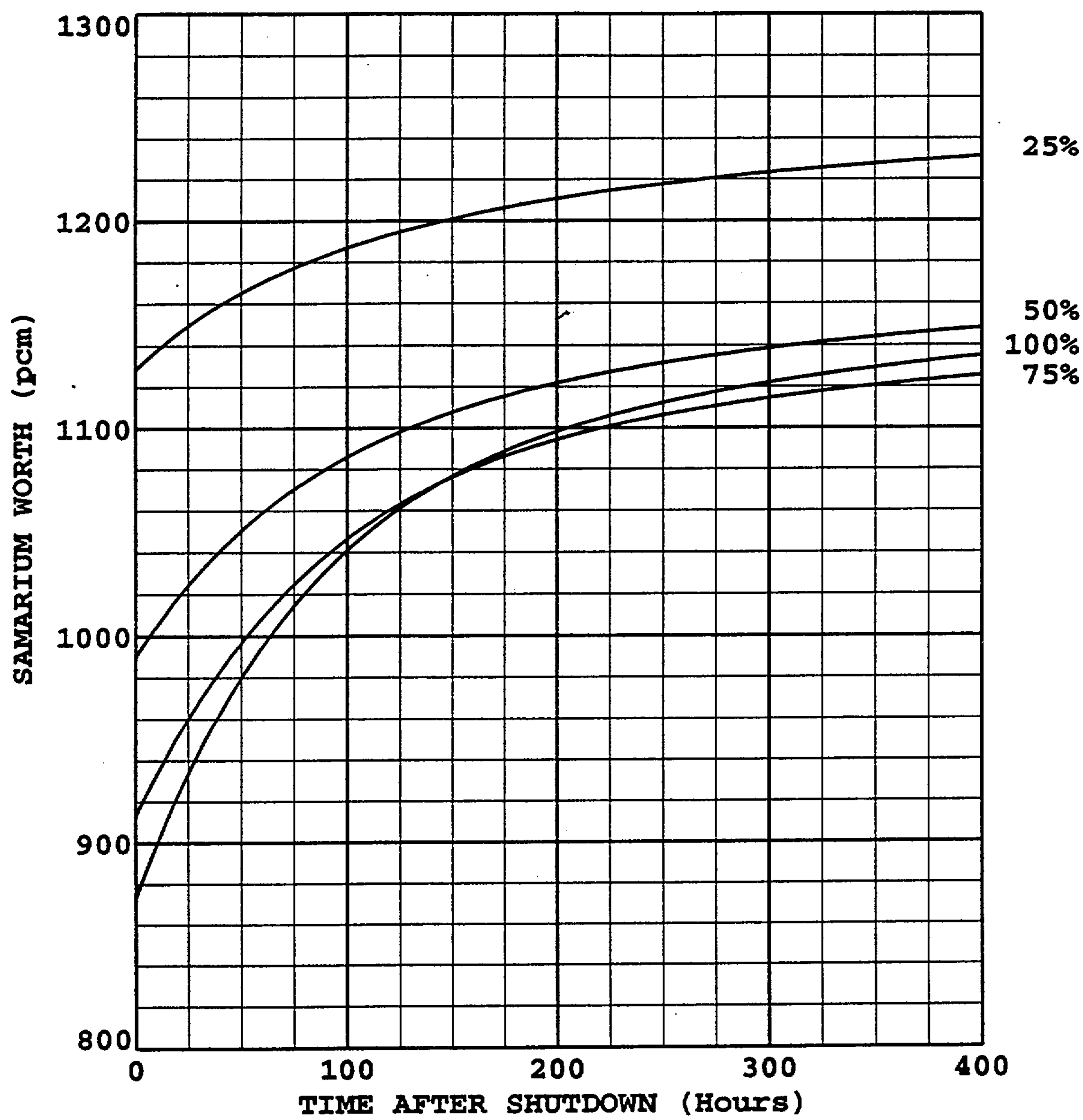
UNITS IN PCM

Reviewed By [signature] Date 12/19/99

REACTIVITY CURVES

TAB 1.4.4-F1
SAMARIUM AFTER SHUTDOWN (BOL)
CYCLE 9

Boron-Free Samarium Worth versus Time Following Plant Trip After Steady State Operation at BOL (Applicable for Burnups ≤ 6500 MWD/MTU)



Reviewed By 12/19/99 Date

REACTIVITY CURVES

TAB 1.4.4-T1
SAMARIUM AFTER SHUTDOWN (BOL)
CYCLE 9

Boron-Free Samarium Worth versus Time Following
Plant Trip After Steady State Operation at BOL
(Applicable for Burnups ≤ 6500 MWD/MTU)

Power Level (%)	Time (Hours) 0	5	10	15	20	25	30	35	40
10	1256.0	1259.0	1261.7	1264.3	1266.7	1269.0	1271.1	1273.1	1275.0
20	1161.0	1165.1	1169.0	1172.7	1176.1	1179.3	1182.4	1185.3	1188.0
25	1128.5	1133.2	1137.7	1141.9	1145.8	1149.5	1153.0	1156.4	1159.5
30	1096.0	1101.3	1106.4	1111.1	1115.5	1119.7	1123.7	1127.5	1131.0
40	1031.0	1037.5	1043.7	1049.5	1055.0	1060.1	1065.0	1069.6	1074.0
50	990.0	997.7	1005.0	1011.9	1018.4	1024.5	1030.3	1035.8	1041.0
60	949.0	957.9	966.3	974.3	981.8	988.9	995.6	1002.0	1008.0
70	925.0	934.9	944.3	953.3	961.7	969.8	977.4	984.6	991.5
75	913.0	923.4	933.3	942.8	951.7	960.2	968.3	976.0	983.3
80	901.0	911.9	922.3	932.3	941.7	950.7	959.2	967.3	975.0
90	885.0	897.2	908.9	919.9	930.3	940.2	949.6	958.5	967.0
100	873.0	886.6	899.4	911.6	923.0	933.9	944.1	953.8	963.0

Power Level (%)	Time (Hours) 60	80	100	150	200	250	300	350	400
10	1281.7	1287.3	1292.0	1301.5	1308.6	1314.3	1319.0	1322.9	1326.2
20	1197.6	1205.4	1212.0	1224.5	1233.3	1239.9	1245.0	1249.1	1252.6
25	1170.5	1179.5	1187.0	1201.0	1210.8	1217.8	1223.3	1227.6	1231.2
30	1143.4	1153.6	1162.0	1177.6	1188.2	1195.8	1201.5	1206.0	1209.7
40	1089.3	1101.8	1112.0	1130.7	1143.1	1151.7	1158.0	1162.8	1166.8
50	1059.2	1073.9	1086.0	1107.8	1121.9	1131.5	1138.5	1143.9	1148.2
60	1029.1	1046.1	1060.0	1084.8	1100.6	1111.3	1119.0	1124.9	1129.7
70	1015.6	1035.1	1051.0	1079.1	1096.5	1108.0	1116.0	1122.0	1126.9
75	1008.9	1029.6	1046.5	1076.2	1094.5	1106.3	1114.5	1120.6	1125.5
80	1002.1	1024.1	1042.0	1073.4	1092.4	1104.6	1113.0	1119.2	1124.1
90	996.6	1020.6	1040.0	1074.0	1094.8	1108.0	1117.0	1123.6	1128.7
100	994.9	1020.5	1041.0	1076.7	1098.4	1112.3	1122.0	1129.2	1135.0

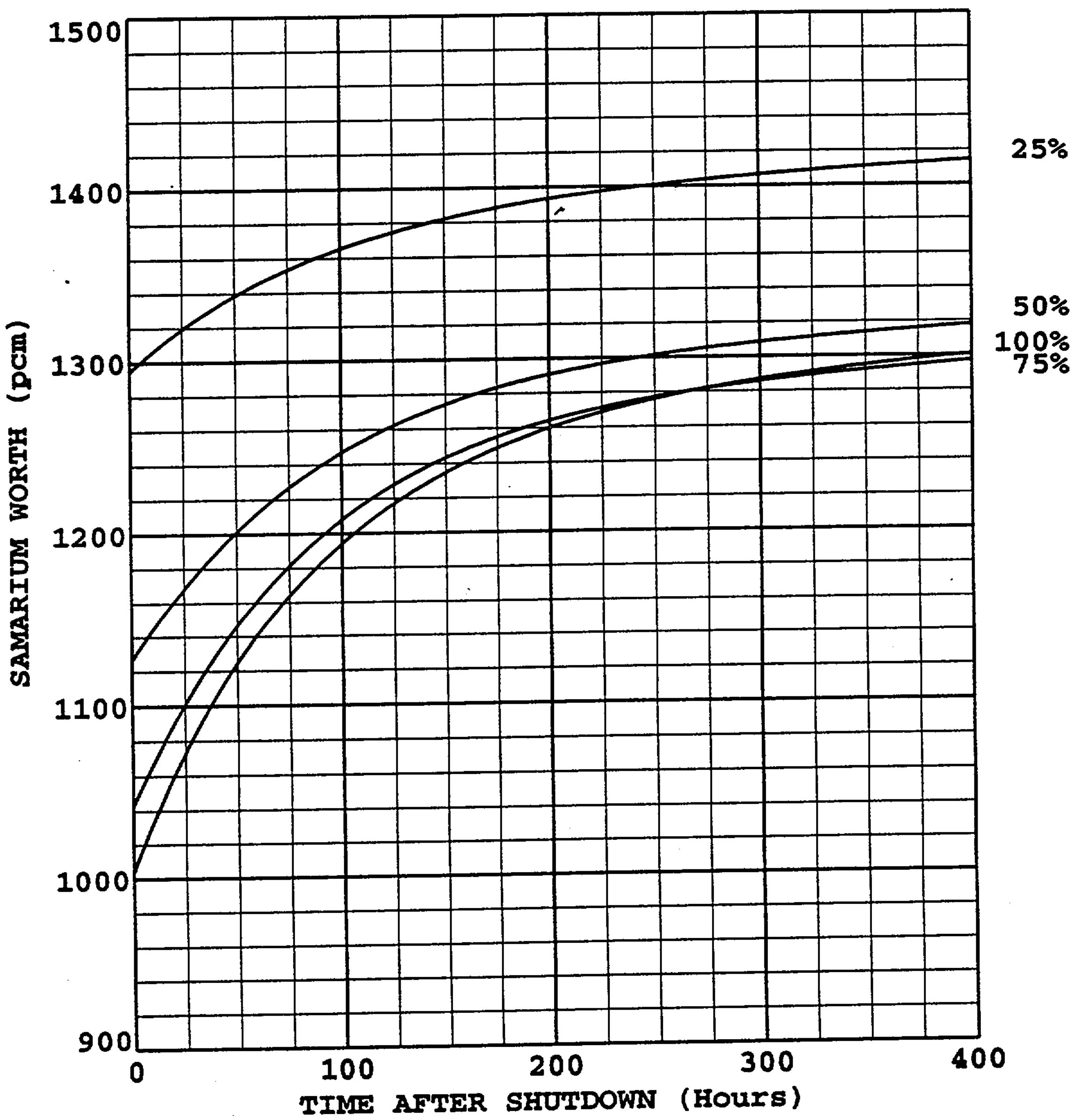
UNITS IN PCM

Phillip L. Copp 12/19/99
Reviewed By Date

REACTIVITY CURVES

TAB 1.4.4-F2
SAMARIUM AFTER SHUTDOWN (MOL)
CYCLE 9

Boron-Free Samarium Worth versus Time Following Plant Trip After Steady State Operation at MOL (Applicable for Burnups > 6500 and ≤ 14000 MWD/MTU)



Reviewed By: Phillip L. Gage   Date: 12/19/99

REACTIVITY CURVES

TAB 1.4.4-T2
SAMARIUM AFTER SHUTDOWN (MOL)
CYCLE 9

Boron-Free Samarium Worth versus Time Following
Plant Trip After Steady State Operation at MOL
(Applicable for Burnups > 6500 and ≤ 14000 MWD/MTU)

Power Level (%)	Time (Hours) 0	5	10	15	20	25	30	35	40
10	1452.0	1454.9	1457.7	1460.3	1462.8	1465.3	1467.6	1469.9	1472.0
20	1335.0	1339.8	1344.3	1348.6	1352.7	1356.6	1360.2	1363.7	1367.0
25	1294.5	1300.0	1305.2	1310.2	1314.9	1319.3	1323.6	1327.6	1331.5
30	1254.0	1260.2	1266.1	1271.7	1277.0	1282.1	1287.0	1291.6	1296.0
40	1173.0	1180.6	1187.8	1194.7	1201.4	1207.7	1213.7	1219.5	1225.0
50	1126.5	1135.6	1144.3	1152.7	1160.6	1168.2	1175.5	1182.4	1189.0
60	1080.0	1090.6	1100.8	1110.6	1119.9	1128.8	1137.2	1145.3	1153.0
70	1055.0	1067.1	1078.7	1089.7	1100.3	1110.3	1119.8	1128.9	1137.5
75	1042.5	1055.4	1067.6	1079.3	1090.5	1101.0	1111.1	1120.7	1129.8
80	1030.0	1043.6	1056.6	1068.9	1080.7	1091.8	1102.4	1112.5	1122.0
90	1016.0	1031.0	1045.2	1058.6	1071.2	1083.1	1094.4	1105.0	1115.0
100	1004.0	1019.5	1034.1	1047.9	1060.9	1073.2	1084.8	1095.7	1106.0

Power Level (%)	Time (Hours) 60	80	100	150	200	250	300	350	400
10	1479.8	1486.4	1492.0	1502.9	1510.7	1516.5	1521.0	1524.7	1527.9
20	1378.6	1388.2	1396.0	1410.4	1420.0	1426.8	1432.0	1436.2	1439.8
25	1345.1	1356.3	1365.5	1382.3	1393.2	1400.7	1406.3	1410.6	1414.3
30	1311.6	1324.4	1335.0	1354.1	1366.4	1374.6	1380.5	1385.1	1388.8
40	1244.6	1260.7	1274.0	1297.8	1312.7	1322.4	1329.0	1333.9	1337.8
50	1212.4	1231.5	1247.0	1274.3	1290.9	1301.4	1308.5	1313.8	1318.0
60	1180.1	1202.2	1220.0	1250.8	1269.1	1280.4	1288.0	1293.7	1298.2
70	1167.8	1192.3	1212.0	1246.0	1265.9	1278.3	1286.5	1292.5	1297.3
75	1161.6	1187.3	1208.0	1243.5	1264.4	1277.2	1285.8	1292.0	1296.9
80	1155.5	1182.4	1204.0	1241.1	1262.8	1276.2	1285.0	1291.4	1296.4
90	1149.8	1177.7	1200.0	1238.8	1262.2	1277.0	1287.0	1294.2	1299.8
100	1141.9	1170.7	1194.0	1234.9	1260.0	1276.1	1287.0	1294.8	1300.6

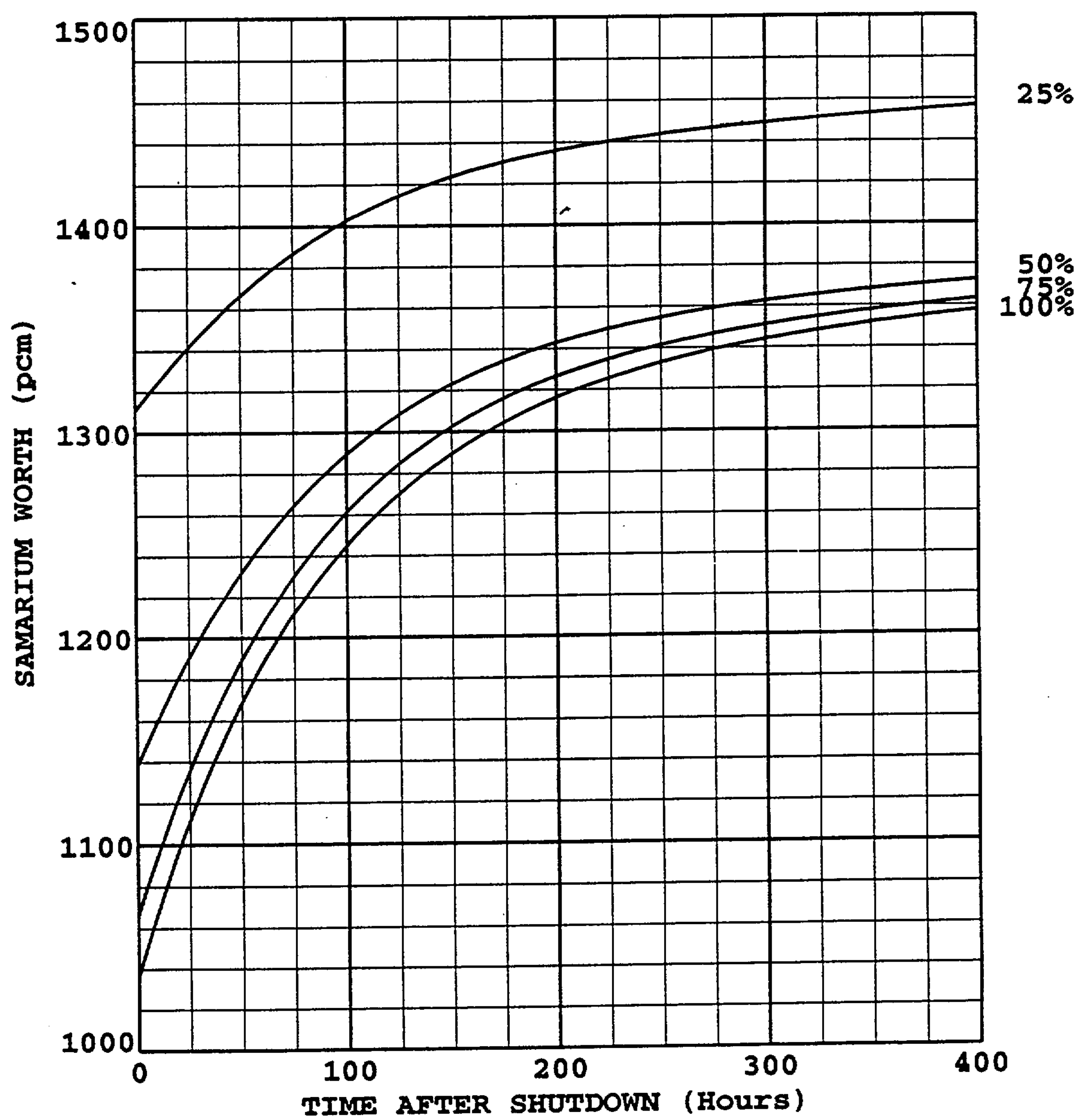
UNITS IN PCM

Reviewed By: Phillip 2. Cyr   Date: 12/19/99

REACTIVITY CURVES

TAB 1.4.4-F3
SAMARIUM AFTER SHUTDOWN (EOL)
CYCLE 9

Boron-Free Samarium Worth versus Time Following
Plant Trip After Steady State Operation at EOL
(Applicable for Burnups > 14000 MWD/MTU



Reviewed By: William D. Cooper   Date: 12/19/99

REACTIVITY CURVES

TAB 1.4.4-T3
SAMARIUM AFTER SHUTDOWN (EOL)
CYCLE 9

Boron-Free Samarium Worth versus Time Following Plant Trip After Steady State Operation at EOL (Applicable for Burnups > 14000 MWD/MTU)

Power Level (%)	Time (Hours) 0	5	10	15	20	25	30	35	40
10	1493.0	1496.6	1500.1	1503.4	1506.6	1509.6	1512.6	1515.3	1518.0
20	1355.0	1360.4	1365.6	1370.7	1375.7	1380.5	1385.2	1389.7	1394.0
25	1311.0	1317.4	1323.6	1329.6	1335.5	1341.2	1346.7	1351.9	1357.0
30	1267.0	1274.4	1281.5	1288.5	1295.3	1301.8	1308.1	1314.2	1320.0
40	1179.0	1188.4	1197.5	1206.3	1214.9	1223.1	1231.1	1238.7	1246.0
50	1138.0	1149.4	1160.3	1170.7	1180.7	1190.3	1199.5	1208.2	1216.5
60	1097.0	1110.4	1123.1	1135.1	1146.6	1157.5	1167.8	1177.7	1187.0
70	1076.5	1091.2	1105.2	1118.5	1131.1	1143.1	1154.5	1165.3	1175.5
75	1066.3	1081.7	1096.3	1110.2	1123.4	1135.9	1147.8	1159.1	1169.8
80	1056.0	1072.1	1087.4	1101.9	1115.7	1128.7	1141.1	1152.9	1164.0
90	1045.0	1062.0	1078.2	1093.5	1108.1	1121.8	1134.9	1147.3	1159.0
100	1036.0	1053.0	1069.0	1084.1	1098.4	1111.8	1124.6	1136.6	1148.0

Power Level (%)	Time (Hours) 60	80	100	150	200	250	300	350	400
10	1527.5	1535.4	1542.0	1554.2	1562.4	1568.4	1573.0	1576.9	1580.4
20	1409.6	1422.5	1433.0	1451.3	1462.2	1469.0	1474.0	1478.0	1481.6
25	1375.2	1390.3	1402.5	1423.7	1436.0	1443.7	1449.0	1453.2	1456.9
30	1340.8	1358.0	1372.0	1396.0	1409.8	1418.3	1424.0	1428.4	1432.2
40	1272.1	1293.6	1311.0	1340.7	1357.5	1367.5	1374.0	1378.8	1382.8
50	1246.0	1270.0	1289.5	1323.2	1342.9	1354.8	1362.5	1368.0	1372.3
60	1219.8	1246.4	1268.0	1305.7	1328.2	1342.0	1351.0	1357.2	1361.9
70	1211.4	1240.3	1263.5	1303.6	1327.2	1341.6	1351.0	1357.6	1362.6
75	1207.1	1237.2	1261.3	1302.6	1326.7	1341.4	1351.0	1357.8	1363.0
80	1202.9	1234.1	1259.0	1301.6	1326.3	1341.2	1351.0	1358.0	1363.4
90	1199.9	1232.8	1259.0	1303.9	1330.0	1345.8	1356.0	1363.1	1368.6
100	1187.7	1219.4	1245.0	1289.5	1316.3	1333.0	1344.0	1351.7	1357.5

UNITS IN PCM

Reviewed By (signature) Date 12/19/99

REACTIVITY CURVES

TAB 1.4.5
XENON AND SAMARIUM CORRECTION FACTOR
CYCLE 9

INTEGRAL BORON WORTH	XENON AND SAMARIUM CORRECTION FACTOR
0	1.00000
1,000	0.98763
2,000	0.97526
3,000	0.96289
4,000	0.95052
5,000	0.93815
6,000	0.92578
7,000	0.91341
8,000	0.90104
9,000	0.88867
10,000	0.87630
11,000	0.86393
12,000	0.85156
13,000	0.83919
14,000	0.82682
15,000	0.81445
16,000	0.80208
17,000	0.78971
18,000	0.77734
19,000	0.76497
20,000	0.75260
21,000	0.74023
22,000	0.72786
23,000	0.71549
24,000	0.70312
25,000	0.69075
26,000	0.67838
27,000	0.66601
28,000	0.65364
29,000	0.64127
30,000	0.62890

$$\text{Xenon and Samarium Correction Factor} = 1 - \frac{(0.1237) \times (\text{Integral Boron Worth})}{10{,}000}$$

CORRECTION FACTOR DUE TO BORON EFFECTS ON XENON AND SAMARIUM

Reviewed By Phillip L. Cyr Date 2/19/99

REACTIVITY CURVES

TAB 1.5.1-T1
ROD WORTH (BOL)
CYCLE 9

Differential and Integral Rod Worth versus Steps Withdrawn, Banks D, C, and B
Moving with 113 Step Overlap at BOL, HFP, HFP-Eq-Xe
(Applicable for Burnups ≤ 6500 MWD/MTU)

Steps Withdrawn Control Bank			Differential Worth	Integral Worth
D	C	B	(pcm/step)	(pcm)
228	228	228	0.14	0
220	228	228	0.68	3
210	228	228	1.31	13
200	228	228	1.78	29
190	228	228	2.10	48
180	228	228	2.32	70
170	228	228	2.49	95
160	228	228	2.62	120
150	228	228	2.74	147
140	228	228	2.85	175
130	228	228	2.94	204
120	228	228	3.02	234
110	225	228	3.37	266
100	215	228	4.60	306
90	205	228	5.33	356
80	195	228	5.94	412
70	185	228	6.43	474
60	175	228	6.84	541
50	165	228	7.20	611
40	155	228	7.48	685
30	145	228	7.66	761
20	135	228	7.64	838
10	125	228	7.36	913
0	115	228	6.88	984
0	110	225	5.92	1016
0	100	215	6.97	1081
0	90	205	7.77	1155
0	80	195	8.53	1237
0	70	185	9.25	1326
0	60	175	9.92	1422
0	50	165	10.51	1524
0	40	155	10.92	1632
0	30	145	11.00	1742
0	20	135	10.50	1850
0	10	125	9.38	1949
0	0	115	7.98	2036

Phillip L. Cyr 12/19/99
Reviewed By Date

REACTIVITY CURVES

TAB 1.5.1-T2
ROD WORTH (BOL)
CYCLE 9

Differential and Integral Rod Worth versus Steps Withdrawn, Banks D, C, and B
Moving with 113 Step Overlap at BOL, HZP, HFP-Eq-Xe
(Applicable for Burnups ≤ 6500 MWD/MTU)

Steps Withdrawn Control Bank D	C	B	Differential Worth (pcm/step)	Integral Worth (pcm)
228	228	228	0.15	0
220	228	228	0.83	4
210	228	228	1.65	16
200	228	228	2.20	35
190	228	228	2.51	59
180	228	228	2.68	85
170	228	228	2.79	112
160	228	228	2.87	140
150	228	228	2.95	169
140	228	228	3.03	199
130	228	228	3.10	230
120	228	228	3.15	261
110	225	228	3.39	294
100	215	228	4.35	332
90	205	228	4.92	378
80	195	228	5.32	429
70	185	228	5.63	484
60	175	228	5.90	542
50	165	228	6.13	602
40	155	228	6.33	664
30	145	228	6.46	728
20	135	228	6.49	792
10	125	228	6.42	857
0	115	228	6.27	920
0	110	225	5.59	949
0	100	215	6.35	1009
0	90	205	7.09	1076
0	80	195	7.89	1151
0	70	185	8.72	1234
0	60	175	9.52	1325
0	50	165	10.14	1423
0	40	155	10.38	1525
0	30	145	10.07	1627
0	20	135	9.23	1723
0	10	125	8.15	1810
0	0	115	7.17	1886

12/19/99
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REACTIVITY CURVES

TAB 1.5.1-T3
ROD WORTH (BOL)
CYCLE 9

Differential and Integral Rod Worth versus Steps Withdrawn, Banks D, C, and B Moving with 113 Step Overlap at BOL, HZP, HZP-Pk-Xe (Applicable for Burnups ≤ 6500 MWD/MTU)

Steps Withdrawn Control Bank D	C	B	Differential Worth (pcm/step)	Integral Worth (pcm)
228	228	228	0.36	0
220	228	228	1.99	9
210	228	228	3.62	37
200	228	228	4.34	77
190	228	228	4.38	120
180	228	228	4.09	162
170	228	228	3.70	200
160	228	228	3.31	235
150	228	228	2.97	266
140	228	228	2.69	294
130	228	228	2.48	320
120	228	228	2.31	344
110	225	228	2.73	369
100	215	228	4.82	406
90	205	228	5.31	456
80	195	228	5.39	509
70	185	228	5.48	563
60	175	228	5.74	619
50	165	228	6.15	678
40	155	228	6.60	741
30	145	228	6.91	808
20	135	228	6.85	876
10	125	228	6.33	942
0	115	228	5.56	1001
0	110	225	3.70	1024
0	100	215	4.45	1064
0	90	205	5.10	1111
0	80	195	5.93	1166
0	70	185	7.03	1230
0	60	175	8.43	1307
0	50	165	10.07	1399
0	40	155	11.66	1507
0	30	145	12.60	1627
0	20	135	12.10	1750
0	10	125	10.08	1860
0	0	115	7.77	1948

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REACTIVITY CURVES

TAB 1.5.1-T4
ROD WORTH (MOL)
CYCLE 9

Differential and Integral Rod Worth versus Steps Withdrawn, Banks D, C, and B Moving with 113 Step Overlap at MOL, HFP, HFP-Eq-Xe (Applicable for Burnups > 6500 and ≤ 14000 MWD/MTU)

Steps Withdrawn Control Bank D	C	B	Differential Worth (pcm/step)	Integral Worth (pcm)
228	228	228	0.20	0
220	228	228	1.00	5
210	228	228	2.08	20
200	228	228	2.77	45
190	228	228	3.07	74
180	228	228	3.14	105
170	228	228	3.10	136
160	228	228	3.03	167
150	228	228	2.95	197
140	228	228	2.89	226
130	228	228	2.84	255
120	228	228	2.80	283
110	225	228	3.15	313
100	215	228	4.79	353
90	205	228	5.87	407
80	195	228	6.55	469
70	185	228	6.96	537
60	175	228	7.26	608
50	165	228	7.56	683
40	155	228	7.85	760
30	145	228	8.06	840
20	135	228	7.95	920
10	125	228	7.32	997
0	115	228	6.24	1065
0	110	225	5.02	1093
0	100	215	6.32	1150
0	90	205	7.32	1218
0	80	195	8.12	1296
0	70	185	8.80	1381
0	60	175	9.49	1473
0	50	165	10.24	1572
0	40	155	10.96	1678
0	30	145	11.41	1790
0	20	135	11.10	1903
0	10	125	9.64	2007
0	0	115	7.45	2093

Reviewed By: [signature] Date: 2/19/99

REACTIVITY CURVES

TAB 1.5.1-T5
ROD WORTH (MOL)
CYCLE 9

Differential and Integral Rod Worth versus Steps Withdrawn, Banks D, C, and B
Moving with 113 Step Overlap at MOL, HZP, HFP-Eq-Xe
(Applicable for Burnups > 6500 and ≤ 14000 MWD/MTU)

Steps Withdrawn Control Bank D	C	B	Differential Worth (pcm/step)	Integral Worth (pcm)
228	228	228	0.30	0
220	228	228	1.68	8
210	228	228	3.74	35
200	228	228	4.92	78
190	228	228	5.24	128
180	228	228	5.03	180
170	228	228	4.62	228
160	228	228	4.15	271
150	228	228	3.70	310
140	228	228	3.28	345
130	228	228	2.91	376
120	228	228	2.57	403
110	225	228	2.79	430
100	215	228	5.18	469
90	205	228	6.61	528
80	195	228	6.98	596
70	185	228	6.90	665
60	175	228	6.83	733
50	165	228	6.91	802
40	155	228	7.07	871
30	145	228	7.15	942
20	135	228	6.91	1012
10	125	228	6.24	1077
0	115	228	5.33	1135
0	110	225	4.33	1159
0	100	215	5.33	1207
0	90	205	6.12	1264
0	80	195	6.75	1328
0	70	185	7.51	1399
0	60	175	8.49	1479
0	50	165	9.62	1569
0	40	155	10.61	1669
0	30	145	10.93	1776
0	20	135	10.08	1881
0	10	125	8.20	1972
0	0	115	6.22	2044

Reviewed By: Ollay D. Cyp   Date: 2/19/99

REACTIVITY CURVES

TAB 1.5.1-T6
ROD WORTH (MOL)
CYCLE 9

Differential and Integral Rod Worth versus Steps Withdrawn, Banks D, C, and B Moving with 113 Step Overlap at MOL, HZP, HZP-Pk-Xe (Applicable for Burnups > 6500 and ≤ 14000 MWD/MTU)

Steps Withdrawn Control Bank D	C	B	Differential Worth (pcm/step)	Integral Worth (pcm)
				0
228	228	228	0.45	
				12
220	228	228	2.53	
				50
210	228	228	5.23	
				109
200	228	228	6.48	
				173
190	228	228	6.54	
				236
180	228	228	5.97	
				291
170	228	228	5.22	
				339
160	228	228	4.46	
				380
150	228	228	3.75	
				414
140	228	228	3.09	
				442
130	228	228	2.51	
				464
120	228	228	1.99	
				487
110	225	228	2.58	
				535
100	215	228	7.08	
				616
90	205	228	9.16	
				708
80	195	228	9.30	
				797
70	185	228	8.58	
				878
60	175	228	7.83	
				954
50	165	228	7.37	
				1026
40	155	228	7.16	
				1096
30	145	228	6.98	
				1164
20	135	228	6.58	
				1225
10	125	228	5.75	
				1277
0	115	228	4.72	
				1299
0	110	225	4.19	
				1353
0	100	215	6.68	
				1425
0	90	205	7.64	
				1501
0	80	195	7.67	
				1577
0	70	185	7.76	
				1657
0	60	175	8.27	
				1744
0	50	165	9.15	
				1840
0	40	155	10.10	
				1942
0	30	145	10.54	
				2043
0	20	135	9.78	
				2131
0	10	125	7.82	
				2198
0	0	115	5.76	

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REACTIVITY CURVES

TAB 1.5.1-T7
ROD WORTH (EOL)
CYCLE 9

Differential and Integral Rod Worth versus Steps Withdrawn, Banks D, C, and B Moving with 113 Step Overlap at EOL, HFP, HFP-Eq-Xe
(Applicable for Burnups > 14000 MWD/MTU)

Steps Withdrawn Control Bank D	C	B	Differential Worth (pcm/step)	Integral Worth (pcm)
228	228	228	0.30	0
220	228	228	1.53	7
210	228	228	3.12	31
200	228	228	3.91	66
190	228	228	4.05	106
180	228	228	3.90	146
170	228	228	3.67	184
160	228	228	3.45	219
150	228	228	3.27	253
140	228	228	3.13	285
130	228	228	3.00	316
120	228	228	2.89	346
110	225	228	3.37	377
100	215	228	5.82	423
90	205	228	7.16	488
80	195	228	7.66	563
70	185	228	7.74	640
60	175	228	7.75	718
50	165	228	7.87	796
40	155	228	8.09	876
30	145	228	8.35	958
20	135	228	8.38	1042
10	125	228	7.81	1124
0	115	228	6.53	1196
0	110	225	5.22	1225
0	100	215	7.04	1287
0	90	205	8.17	1363
0	80	195	8.78	1448
0	70	185	9.17	1538
0	60	175	9.60	1632
0	50	165	10.21	1732
0	40	155	10.94	1838
0	30	145	11.60	1951
0	20	135	11.65	2067
0	10	125	10.33	2178
0	0	115	7.82	2269

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REACTIVITY CURVES

TAB 1.5.1-T8
ROD WORTH (EOL)
CYCLE 9

Differential and Integral Rod Worth versus Steps Withdrawn, Banks D, C, and B Moving with 113 Step Overlap at EOL, HZP, HFP-Eq-Xe (Applicable for Burnups > 14000 MWD/MTU)

Steps Withdrawn Control Bank D	C	B	Differential Worth (pcm/step)	Integral Worth (pcm)
228	228	228	0.49	0
220	228	228	2.78	13
210	228	228	6.18	58
200	228	228	7.67	127
190	228	228	7.59	203
180	228	228	6.77	274
170	228	228	5.75	336
160	228	228	4.76	389
150	228	228	3.84	432
140	228	228	3.03	466
130	228	228	2.32	492
120	228	228	1.73	513
110	225	228	2.43	533
100	215	228	7.98	585
90	205	228	11.04	680
80	195	228	11.28	791
70	185	228	10.24	898
60	175	228	9.01	994
50	165	228	8.11	1079
40	155	228	7.51	1157
30	145	228	6.98	1229
20	135	228	6.22	1295
10	125	228	5.08	1351
0	115	228	3.88	1396
0	110	225	3.78	1415
0	100	215	7.52	1471
0	90	205	9.42	1555
0	80	195	9.26	1648
0	70	185	8.69	1738
0	60	175	8.57	1824
0	50	165	8.95	1911
0	40	155	9.37	2002
0	30	145	9.09	2094
0	20	135	7.58	2177
0	10	125	5.41	2241
0	0	115	3.68	2287

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REACTIVITY CURVES

TAB 1.5.1-T9
ROD WORTH (EOL)
CYCLE 9

Differential and Integral Rod Worth versus Steps Withdrawn, Banks D, C, and B Moving with 113 Step Overlap at EOL, HZP, HZP-Pk-Xe (Applicable for Burnups > 14000 MWD/MTU)

Steps Withdrawn Control Bank D	C	B	Differential Worth (pcm/step)	Integral Worth (pcm)
228	228	228	0.62	0
220	228	228	3.51	16
210	228	228	7.21	70
200	228	228	8.44	148
190	228	228	7.96	229
180	228	228	6.84	303
170	228	228	5.65	365
160	228	228	4.55	416
150	228	228	3.57	457
140	228	228	2.72	488
130	228	228	2.01	512
120	228	228	1.43	529
110	225	228	2.53	548
100	215	228	9.54	609
90	205	228	12.58	719
80	195	228	12.45	843
70	185	228	11.06	960
60	175	228	9.52	1063
50	165	228	8.25	1151
40	155	228	7.21	1228
30	145	228	6.24	1295
20	135	228	5.17	1352
10	125	228	3.98	1398
0	115	228	2.92	1432
0	110	225	3.56	1448
0	100	215	9.56	1513
0	90	205	12.03	1621
0	80	195	11.60	1739
0	70	185	10.29	1847
0	60	175	9.27	1945
0	50	165	8.75	2035
0	40	155	8.37	2120
0	30	145	7.61	2199
0	20	135	6.17	2268
0	10	125	4.42	2321
0	0	115	3.03	2358

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REACTIVITY CURVES

TAB 1.5.2-T1
ARI-1 ROD WORTH FOR SDM
CYCLE 9

ARI-1 Rod Worth (pcm) for Shutdown Margin Calculation

Burnup Range (MWD/MTU)	Power Level (%) 0	10	20	30	40	50	60	70	80	90	100
≤ 150	3240	3471	3702	3831	3960	4223	4485	4722	4958	5056	5153
> 150 ≤ 1000	3470	3705	3940	4070	4199	4457	4714	4940	5166	5267	5368
> 1000 ≤ 2000	3741	3979	4216	4345	4474	4725	4975	5183	5390	5498	5605
> 2000 ≤ 3000	3906	4151	4396	4522	4647	4893	5138	5336	5533	5637	5741
> 3000 ≤ 4000	4017	4273	4528	4649	4769	5017	5265	5464	5663	5760	5856
> 4000 ≤ 5000	4055	4319	4582	4698	4814	5062	5310	5503	5696	5790	5883
> 5000 ≤ 6000	4058	4329	4599	4712	4824	5067	5310	5507	5704	5792	5880
> 6000 ≤ 7000	4061	4339	4616	4725	4834	5072	5309	5510	5711	5794	5876
> 7000 ≤ 8000	4047	4330	4612	4717	4823	5054	5285	5491	5697	5776	5856
> 8000 ≤ 9000	4033	4321	4608	4710	4811	5036	5260	5472	5683	5759	5835
> 9000 ≤ 10000	4012	4298	4584	4687	4789	5006	5223	5442	5662	5732	5803
> 10000 ≤ 11000	3990	4275	4560	4664	4767	4977	5186	5413	5640	5705	5770
> 11000 ≤ 12000	3968	4253	4539	4643	4747	4950	5153	5388	5622	5683	5745
> 12000 ≤ 13000	3946	4231	4517	4622	4727	4924	5121	5362	5604	5662	5719
> 13000 ≤ 14000	3923	4209	4496	4601	4707	4897	5088	5337	5586	5640	5694
> 14000 ≤ 15000	3901	4188	4474	4581	4687	4871	5055	5312	5568	5618	5668
> 15000 ≤ 16000	3861	4145	4430	4540	4650	4829	5008	5270	5531	5578	5624
> 16000 ≤ 17000	3820	4103	4386	4499	4612	4787	4961	5228	5494	5537	5580
> 17000 ≤ 18000	3795	4078	4360	4476	4592	4760	4928	5202	5476	5520	5564
> 18000 ≤ 19000	3770	4052	4334	4453	4572	4733	4894	5176	5458	5503	5547
> 19000 ≤ 20000	3749	4032	4315	4439	4562	4717	4873	5163	5452	5493	5535
> 20000 ≤ 21000	3727	4012	4297	4424	4551	4702	4853	5149	5446	5484	5522
> 21000 ≤ 21800	3710	3996	4282	4413	4543	4690	4836	5139	5441	5477	5512
> 21800 ≤ 23000	3710	3996	4282	4413	4543	4690	4836	5139	5441	5477	5512

[illegible signature] 12/19/99
Reviewed By Date

REACTIVITY CURVES

TAB 1.5.3-T1
WORTH OF MOST REACTIVE
ROD FOR SDM
CYCLE 9

Worth of Most Reactive Rod (pcm) for Shutdown Margin Calculations

Burnup Range (MWD/MTU)	Power Level 0% to 100%
≤ 150	903
> 150 ≤ 1000	849
> 1000 ≤ 2000	787
> 2000 ≤ 3000	808
> 3000 ≤ 4000	848
> 4000 ≤ 5000	859
> 5000 ≤ 6000	862
> 6000 ≤ 7000	865
> 7000 ≤ 8000	861
> 8000 ≤ 9000	857
> 9000 ≤ 10000	850
>10000 ≤ 11000	844
>11000 ≤ 12000	837
>12000 ≤ 13000	831
>13000 ≤ 14000	825
>14000 ≤ 15000	819
>15000 ≤ 16000	825
>16000 ≤ 17000	830
>17000 ≤ 18000	848
>18000 ≤ 19000	865
>19000 ≤ 20000	889
>20000 ≤ 21000	912
>21000 ≤ 21800	931
>21800 ≤ 23000	931

Reviewed By: [signature] Date: 12/19/99

REFERENCE USE PROCEDURE **PRB REVIEW REQUIRED**

1.0 PURPOSE

This procedure provides controls on the use of overtime to prevent situations where job-influenced fatigue could reduce the ability of plant personnel to keep the reactor in a safe condition.

2.0 SCOPE

This procedure applies to the plant staff and contractors responsible for performing safety related operating or maintenance functions. Examples of such personnel include licensed Senior Reactor Operators, licensed Reactor Operators, key Health Physics Technicians, key non-licensed operators, and key Maintenance personnel.

3.0 GUIDELINES AND RESTRICTIONS

3.1 Plant personnel should work a nominal 40-hour week while the plant is operating. Adequate shift coverage shall be maintained without routine heavy use of overtime.

3.2 In the event that unforeseen problems require substantial amounts of overtime to be used, or during extended periods of shutdown for refueling, major maintenance or major plant modifications, on a temporary basis the following guidelines shall be followed for plant personnel as defined in the scope of this procedure:

a. An individual should not be permitted to work more than 16 hours straight (excluding shift turnover time).

b. An individual should not be permitted to work more than 16 hours in any 24-hour period, nor more than 24 hours in any 48-hour period, nor more than 72 hours in any 7 day period (all excluding shift turnover time).

c. A break of at least 8 hours should be allowed between work periods (including shift turnover time).

d. Except during extended shutdown periods, the use of overtime should be considered on an individual basis and not for the entire staff on a shift.

3.3 Any deviation from the guidelines established in Subsection 3.2 shall be authorized by the applicable department manager or higher level of management prior to hours being worked. Prior verbal approval by one of the authorized levels is acceptable. Such authorization and its justification shall be recorded on a form similar to Figure 1, within 2 weeks, if written approval was not obtained prior to hours being worked. Forms are forwarded to the GMNP for review.

3.4 The GMNP, or designee, shall review the form(s), at least monthly, to assure excessive hours were properly authorized, and to assure that heavy use of overtime does not become routine. The GMNP, or designee, will sign the form(s) to document this review.

3.5 The original of these forms will be sent to document control to be retained for at least five (5) years.

4.0 REFERENCES

4.1 NUREG-0737 (Item I.A.1.3)

4.2 NRC Generic letter No. 82-12 "Nuclear Power Plant Staff Working Hours," dated June 15, 1982.

4.3 NRC Generic letter No. 82-16

4.4 VEGP FSAR Section 13.5.1.1.G

4.5 Technical Specification 5.2

4.6 Procedure 00012-C, "Shift Manning Requirements"

END OF PROCEDURE TEXT

EXCESS OVERTIME AUTHORIZATION

Name	Department	Position	Date(s)

1. **OVERTIME ANTICIPATED:**
   - ☐ > 16 HOURS STRAIGHT
   - ☐ > 16 HOURS PER 24 HOUR PERIOD
   - ☐ > 24 HOURS PER 48 HOUR PERIOD
   - ☐ > 72 HOURS PER 7 DAY PERIOD
   - ☐ < 8 HOURS BREAK BETWEEN WORK PERIODS

2. **TYPE OF PROBLEM:**
   - ☐ UNFORESEEN
   - ☐ REFUELING
   - ☐ MAJOR MODIFICATION OR MAINTENANCE

3. **JUSTIFICATION:**

4. **APPROVAL (Verbal or written approval should be before overtime is required)**

Approved By:	Date

5. **Upon approval, forward this authorization to the GMNP for review.**

GMNP or Designee:	Date

6. **DISTRIBUTION**

Original: Document Control
Copy: Financial Services

TABLE OF CONTENTS

1.0 **PURPOSE**

1.1 This surveillance procedure is used to demonstrate the operability of the Emergency Diesel Generators. This procedure should not be used for maintenance or trouble shooting.

1.2 This surveillance satisfies these Technical Specification Requirements:

SR 3.8.1.2	SR 3.8.1.5	SR 3.8.3.1
SR 3.8.1.3	SR 3.8.1.6	SR 3.8.3.2
SR 3.8.1.4	SR 3.8.1.7	SR 3.8.3.4

1.3 The frequency of this test is every 31 days, on a staggered test basis.

2.0 **APPLICABILITY**

2.1 This surveillance is applicable in Modes 1, 2, 3 and 4.

2.2 Portions of this surveillance are applicable in Modes 5 and 6.

2.3 This Surveillance procedure is comprised of two sections; Section A for DG1A and Section B for DG1B. Only one Train Diesel Generator shall be paralleled to an offsite power source at any time. The procedural guidelines pertaining to the Diesel Generator not being tested, are not to be performed, and may be deleted from this surveillance package.

3.0 **PRECAUTIONS AND LIMITATIONS**

3.1 The Unit Shift Supervisor (USS) shall be notified immediately if a subsystem or component malfunctions or test data indicate a potential problem during a surveillance test.

3.2 The rated capacity of a Diesel Generator is 7000 kW. Load should not be permitted to exceed this limit during testing. The Diesel Generator should not be operated at less than 30% load (2100 kW) for prolonged periods of time.

3.3 During Diesel Generator load testing, loads in excess of 7000 kW or momentary variations due to changing bus loads shall not invalidate the test.

3.4 If during a Diesel Engine start the Fail To Start alarm comes in but the engine keeps running, the support systems will operate as if the engine was shut down. To reset these systems the START pushbutton must be pressed. This will stop the Keep Warm Pumps, turn off the Keep Warm Heaters, start the Crankcase Fans and place the alarms in service that are bypassed when shut down.

3.5 If a Diesel Generator is being restarted following a Diesel Generator failure, Checklist 1(2) of 13145-1 shall be completed prior to restart.

3.6 Once initiated, the Diesel Generator shutdown signals remain in effect for 90 seconds. During this period, the Diesel Generator will only respond to an emergency start signal. To prevent the depletion of starting air, wait until the local red stopping light is OFF (approximately 90 seconds) after a normal stop before attempting to start the diesel.

3.7 All start attempts, both manual and automatic, shall be documented in the Control Room Autolog. The log entry shall include the reason for start and start time.

3.8 In the Diesel Generator Log Book record Data on Completion Sheet 1 for each Diesel start (complete with the exception of the Diesel Test Evaluation Section). A copy of Completion Sheet 1 will be sent to the Diesel Generator Engineer and the original will remain in the Diesel Generator Logbook. The Diesel Test Evaluation section of Completion Sheet 1 will be completed by the System Engineer.

3.9 The Emergency Diesel Generators shall not be used for peaking service.

3.10 Diesel Generator surveillance tests shall be initiated only from the Control Room.

3.11 During surveillance testing, only one Diesel Generator shall be paralleled at a time to the off-site power source.

3.12 The Diesel Generator has been aligned for standby per 13145-1, "Diesel Generators" and a current copy of 11145-1, "Diesel Generator Alignment" and 11146-1, "Diesel Generator Fuel Oil Transfer System Alignment" are on file.

3.13 If any unusual grid disturbances occur while the Diesel Generator is operating, start the Fault Recorder in the Control Room and notify the System Engineer for an evaluation of the problem.

3.14 Testing of a Diesel Generator for troubleshooting (i.e., first engine run following major maintenance, etc.) should be performed using 13145-1, "Diesel Generators". If necessary, testing for operability should follow using this procedure.

3.15 A cylinder moisture check shall NOT be performed if in an action statement of Technical Specification LCO 3.8.1 (Modes 1-4).

3.16 NOTIFY appropriate management personnel and Engineering in the event of any Diesel Generator failure or if any abnormal events occur during testing.

3.17 When the Diesel Generator UNIT/PARA Switch is placed in PARA and back to NORMAL, the Unit Parallel Relay will energize and latch in. This will only allow the Diesel Generator to Slow Start, even if an Emergency (Fast) Start is initiated. To remove the Slow Start Signal, the UNIT/PARA Switch must be taken to UNIT, which will de-energize the Unit Parallel Relay, and permit a 30-second Slow Start timer internal to the governor to begin timing. After 30 seconds, the Diesel Generator can Fast Start. Subsequently the Diesel Generator will be inoperable from the time the UNIT/PARA Switch is placed in PARA until the Diesel Generator is excited. If the Diesel Generator is shutdown before the UNIT/PARA Switch has been placed in UNIT, the Diesel Generator will be inoperable from the time it is shutdown until 30 seconds after the UNIT/PARA Switch has been placed in UNIT.

3.18 To serve as a dependable backup power source, a Diesel Generator should be kept separate from the offsite source if it is the only operable diesel. The diesel should remain in standby and only be paralleled with an offsite source to meet surveillance requirements. Parallel operations may be conducted as a part of a preplanned activity if a supporting risk assessment has been completed.

3.19 Tech Spec 3.8.1 acceptable range for bus voltage is between 4025 and 4330 Volts. When the Diesel Generator is paralleled the bus voltage shall be maintained between 4025 and 4326 Volts. (CO 28422)

3.20 When the Diesel Generator is paralleled the kVAR load should be maintained POSITIVE and ≤ half of the KW load.

3.21 In order to satisfy Technical Specifications, SR 3.8.1.3 (load test) must be preceded by a successful start (slow or fast) per SR 3.8.1.2 or SR 3.8.1.7.

INITIALS

SECTION B: DIESEL GENERATOR 1B OPERABILITY TEST

B4.0 **PREREQUISITES OR INITIAL CONDITIONS FOR TESTING DG1B**

B4.1 Determine from the Surveillance Task Sheet which type of Diesel Generator Start shall be performed and CIRCLE the desired Starting alignment:

DG1B SLOW START Section B5.1	DG1B FAST START Section B5.2

a. If performing a SLOW Start for the Monthly Surveillance, delete Section B5.2,

b. If performing a FAST Start for the 6 Month Surveillance, or to meet other requirements, delete Section B5.1.

B4.2 Ensure the following portions of this procedure are selected for performing Diesel Generator 1B Operability Test:

a. SECTION B: DIESEL GENERATOR 1B OPERABILITY TEST

(1) DATA SHEET 3 for DG1B SLOW START

OR

(2) DATA SHEET 4 for DG1B FAST START

b. CHECKLIST 3: DG1B CYLINDER MOISTURE CHECK INDEPENDENT VERIFICATION

c. CHECKLIST 4: DG1B STANDBY MODE STATUS CHECK

B4.3 Obtain a working copy of:

11885-C, "DIESEL GENERATOR OPERATING LOG".

INITIALS

B4.4 The USS shall ensure this surveillance test does not affect other tests presently in progress or jeopardize plant operation prior to granting approval to perform this surveillance test.

______ USS APPROVAL

TEST STARTED ______ DATE ______ TIME ______ MODE

NOTES

a. Section B5.4 "Diesel Generator Air Start Compressor Test" may be performed concurrent with a cylinder moisture check, or air roll. Credit may be taken for an air compressor start which occurs in the course of these evolutions.

b. Cylinder moisture check is NOT required if the Diesel Generator is started within four hours of a Diesel Generator shutdown.

B4.5 DG1B Cylinder Moisture Check

CAUTIONS

a. While performing the cylinder moisture check the Diesel Generator is NOT available for standby service.

b. The Diesel Generator is not to be declared operable until Checklist 3 has been completed and independently verified.

c. If the Diesel Generator is out of service for more than one hour, ensure the action items of Technical Specification LCO 3.8.1 are completed.

d. The cylinder moisture check shall not be performed if this test is performed as an action item of Techical Specification LCO 3.8.1 or LCO 3.8.2.

B4.5.1 Notify control room personnel prior to placing DG1B in local.

INITIALS

B4.5.2 At the Generator Control Panel, PLACE Local/Remote Switch 1-HS-4517 in LOCAL.

B4.5.3 At the Engine Control Panel, DEPRESS Maintenance Mode Pushbutton 1-HS-4578 and VERIFY the blue UNIT AVAILABLE light goes OFF and the red STOPPING light comes ON.

B4.5.4 VERIFY that the Fuel and Air Shutdown Cylinders fully extend.

CAUTION

If any water is discovered in the Intake Air Manifold, notify the Unit Shift Supervisor (USS) and discontinue this procedure until the problem has been identified and corrected.

B4.5.5 OPEN each Intake Manifold Drain to check for water then CLOSE:

a. 1-2403-X4-426 DG1B AIR INTAKE MANIFOLD LEFT BANK DRN

b. 1-2403-X4-428 DG1B AIR INTAKE MANIFOLD RIGHT BANK DRN

c. 1-2403-X4-430 DG1B AIR INTAKE MANIFOLD LEFT BANK DRN

d. 1-2403-X4-432 DG1B AIR INTAKE MANIFOLD RIGHT BANK DRN

B4.5.6 Fully OPEN all cylinder cocks.

NOTE

Any moisture in the Barring Device Air Filter should be removed by blowing down the filter.

B4.5.7 OPEN 1-2403-X4-724 the Air Receiver #1 Supply To Engine Barring Device.

B4.5.8 UNLOCK the Pneumatic Barring Device by removing the lockout pin.

INITIALS

CAUTION

Any evidence of water in the engine during the following steps should be brought to the attention of the USS and this procedure should be discontinued.

NOTE

Two people will be required to perform cylinder moisture checks per this section, one to bar the engine and one to monitor for moisture out of the cylinder petcocks.

B4.5.9 ENGAGE the barring device and bar the engine over for two revolutions while monitoring the cylinder cocks for evidence of moisture.

B4.5.10 CHECK all cylinder cocks for evidence of moisture.

B4.5.11 DISENGAGE and LOCKOUT the Pneumatic Barring Device.

B4.5.12 VERIFY the BARRING DEVICE ENGAGED annunciator alarm resets.

B4.5.13 CLOSE 1-2403-X4-724 Air Receiver #1 Supply to Engine Barring Device.

B4.5.14 OPEN the Turbo Lube Oil Orifice Bypass Valve 1-2403-U4-131 for approximately 30 seconds then close.

NOTES

a. Due to oiling of the cylinders, some oil is expected to be discharged from the cylinder head indicator cocks while rolling the engine.

b. A small amount of moisture mist is expected to be discharged from the indicator cocks while rolling the engine.

B4.5.15 DEPRESS the Engine Roll Pushbutton 1-HS-4580, and ROLL the engine on starting air for at least two revolutions.

B4.5.16 CHECK all cylinder cocks for evidence of moisture.

B4.5.17 CLOSE all cylinder cocks.

INITIALS

B4.5.18 DEPRESS the OPERATIONAL mode pushbutton 1-HS-4576 and VERIFY the blue UNIT AVAILABLE light comes ON and the red STOPPING light goes OFF.

B4.5.19 PLACE the LOCAL/REMOTE Switch 1-HS-4517 in REMOTE.

B4.5.20 COMPLETE Checklist 3, "DG1B Cylinder Moisture Check Independent Verification".

B4.6 NOTIFY the System Operator (8-257-6301)and the Unit 2 Control Room of the Diesel Generator Test. ________

B4.7 Ensure Train B NSCW System is in service to provide cooling water to DG1B Jacket Water Heat Exchangers. ________

B4.8 If Diesel Generator 1B is being started following a Diesel Generator failure, COMPLETE Checklist 2 of 13145-1 if not performed within the last 24 hours. ________

INITIALS

B5.0 **INSTRUCTIONS FOR TESTING DIESEL GENERATOR 1B**

NOTES

a. Once begun, the appropriate portions of this procedure should be completed if possible and the system, subsystem or component returned to service or committed to repair as required.

b. Section B5.3, Fuel Oil Transfer Pump Testing must be completed during the Diesel Generator loaded run. Section B5.4, Air Compressor Test, may be completed during the Diesel Generator loaded run.

c. NOTIFY appropriate management personnel and Engineering in the event of any Diesel Generator failure or if any abnormal events occur during testing.

B5.0.1 TEST annunciator lights at the alarm panel PDG4, and verify that all annunciator lights are operable. ________

B5.0.2 RECORD the Diesel Generator pre-startup readings on Section A of 11885-C, "Diesel Generator Operating Log". ________

B5.0.3 STATION an operator in the Diesel Generator Building to monitor the Diesel Generator operation and maintain a means of communication with the Control Room throughout the duration of the test. ________

INITIALS

B5.2 **DIESEL GENERATOR 1B FAST START AND LOADING**

NOTE

This section should only be performed when satisfying the six-month Surveillance per Technical Specification SR 3.8.1.7, completing an action statement required by LCO 3.8.1 or, if required, when restoring an inoperable Diesel Generator to operable status.

B5.2.1 OBTAIN three stop watches: (Required for DG FAST Start)

No. 1 ID#____________ Cal Due Date____________

No. 2 ID#____________ Cal Due Date____________

No. 3 ID#____________ Cal Due Date____________

B5.2.2 RECORD the engine hours on Data Sheet 4. ________

CAUTION

Do not transfer voltage regulators if the Generator is excited. Excitation must be shut down prior to transferring voltage regulators.

B5.2.3 At Generator Control Panel PDG3 ALIGN the Diesel Generator Voltage Regulators as follows:

a. If the month is January, March, May, July, September, or November, PLACE D/G VOLTAGE REGULATOR SWITCH 1-HS-4912 to the REGULATOR 1 position. ________

b. If the month is February, April, June, August, October or December, PLACE D/G VOLTAGE REGULATOR SWITCH 1-HS-4912 to the REGULATOR 2 position. ________

B5.2.4 RECORD on Data Sheet 4 the Voltage Regulator selected. ________

B5.2.5 RECORD pressure of Air Start Receivers on Data Sheet 4. ________

B5.2.6 PLACE the DSL GEN 1B VM Switch to A-B. ________

B5.2.7 Ensure the DSL GEN 1B UNIT/PARALLEL Switch 1-HS-4452B is in the Unit Mode and OBSERVE the blue DSL GEN 1B UNIT MODE/FAST START light is ON. ________

INITIALS

B5.2.8 Locally at the Generator Control Panel PDG3 Ensure the EXCITER PERMISSIVE Switch 1-HS-4914 is in the NORMAL position. ________

B5.2.9 When starting the Diesel Generator, TIME the following:

a. The time from depressing the Diesel Generator START Pushbutton until voltage exceeds 4025 volts. Diesel Generator voltage should stabilize between 4025 and 4326 volts.

b. The time from depressing the Diesel Generator START Pushbutton until frequency exceeds 58.8 Hz. Diesel Generator frequency should stabilize between 58.8 to 61.2 Hz.

c. Locally at the Diesel Generator Engine Control Panel PDG4, the time from depressing the Diesel Generator START Pushbutton until rpms exceed 450 on SI-19187.

NOTES

a. While the diesel engine is starting the operator in the Diesel Room should verify the escape of air from the Starting Air Manifold Vents to ensure the manifold vents are open and unobstructed. The Starting Air Manifold Vents are located on the bottom of the Air Start Manifold at the governor end of the diesel engine next to cylinders 1L and 1R.

b. Completion Sheet 1 in the Diesel Generator Logbook is required for each start.

c. While the Diesel Generator is in operation check for rubbing or excessive vibration of small diameter tubing supporting Diesel Generator operation, e.g., fuel lines, instrument tubing, or instrument air tubing.

B5.2.10 Request the RO to note the DG start time and document DG1B Fast Start per 14980-1 in the Unit-1 Autolog.

INITIALS

CAUTION

a. During engine operation, the DG should be frequently monitored for fuel oil and/or lube oil leaks. Leaks of this nature represent potential fire hazards. If leaks are present, notify the USS or System Engineer to evaluate condition for continued DG operation.

b. The Turbo Lube Oil Orifice Bypass Valve should be opened 1-2 minutes prior to diesel start, and should be **promptly** closed after the start. Steps B5.2.11 through B5.2.15 should be performed expeditiously. Excess pre-lubrication may result in oil accumulation in the exhaust piping and an exhaust fire may occur upon engine start.

B5.2.11 OPEN Turbo Lube Oil Orifice Bypass Valve 1-2403-U4-131. ________

B5.2.12 At Panel QEAB, DEPRESS the DIESEL GENERATOR START Pushbutton 1-HS-4570B. ________

B5.2.13 MONITOR Turbocharger Oil Pressure Gauges 1-PI-19171 and 1-PI-19171A and VERIFY increasing oil pressure within 15 seconds of starting the Diesel Generator. ________

B5.2.14 **IF** Turbocharger Oil Pressure does not increase within 15 seconds, **THEN** STOP the Diesel Generator by depressing DG1B STOP pushbutton 1-HS-4572B on QEAB. ________

B5.2.15 CLOSE Turbo Lube Oil Orifice Bypass Valve 1-2403-U4-131. ________

____
IV

B5.2.16 If the Generator Field fails to flash, notify Engineering for an evaluation of the problem.

B5.2.17 RECORD pressure of Air Start Receivers on Data Sheet 4. ________

B5.2.18 RECORD the time to voltage, frequency, and 450 rpm on Data Sheet 4. ________

B5.2.19 RECORD the Diesel Generator voltage, frequency, and steady state rpm on Data Sheet 4. ________

INITIALS

B5.2.20 If the Generator Field Ground relay flag is visible, then PERFORM the following at Gen Control Panel PDG3:

a. RESET the DG1B GENERATOR FIELD GROUND RELAY 164 flag, ________

b. DEPRESS the RELAY TARGET RESET PUSHBUTTON. ________

NOTE

The new Vendor Maintenance and Operation Program recommends that the DSL GEN be synchronized and loaded to approximately 1000 KW within 5 minutes of Diesel start.

B5.2.21 Proceed immediately with subsequent steps to synchronize DG1B to 4160 Volt Switchgear 1BA03.

B5.2.22 ENSURE the Diesel Generator 1B SYNC MODE SELECTOR Switch 1TS-DG1B is in AUTO. ________

CAUTION

Never place two sync-switches to the ON position at the same time. A blown PT fuse may result.

NOTES

a. A Synchroscope Meter indication of 12 o'clock may indicate that another breaker synchronization switch is ON.

b. Frequency will drop when the UNIT/PARALLEL Switch is taken to PARALLEL. Restore to normal band if required.

B5.2.23 PLACE the BRKR 1BA0319 Synchronizing Switch to ON. ________

B5.2.24 Momentarily PLACE the DSL GEN 1B UNIT/PARALLEL Switch 1-HS-4452B to PARALLEL and OBSERVE the blue DSL GEN 1B UNIT MODE/FAST START light is off. ________

B5.2.25 SET 1BA03 4160V bus phase voltage to the highest value on the QEAB Voltmeter by moving the BUS 1BA03 NORM INCM VM SW through all positions. ________

INITIALS

B5.2.26 SET the Diesel Generator 1B voltage to the lowest value on the QEAB Voltmeter by moving the DSL GEN 1B VM SW through all positions. ________

B5.2.27 VERIFY that the Synchroscope Meter is rotating and that the synchronizing lights are bright at the 6 o'clock position and dark at the 12 o'clock position and that the AUTO SYNC PERMISSIVE red light comes on near the 12 o'clock position. ________

B5.2.28 ADJUST generator voltage as necessary to approximately 50V above the highest phase of bus voltage. ________

B5.2.29 While observing the Synchroscope, ADJUST the generator speed until the Synchroscope needle is rotating 8 to 10 seconds per rotation in the clockwise (fast) direction. ________

B5.2.30 ADJUST DSL GEN 1B LOADING SET PT CONTROL, 1-SE-4916 to 1.00 (10% D/G LOAD). ________

INITIALS

CAUTIONS

a. If the Diesel Generator is being operated in the Parallel mode never transfer the LOCAL-REMOTE Switch 1-HS-4517 on PDG3 to LOCAL as this will take governor and voltage regulator out of the droop mode.

b. As soon as the DG output breaker closes, be prepared to control kVAR in the specified acceptable range.

B5.2.31 PARALLEL DG1B to bus 1BA03 by performing the following:

a. When the Synchroscope needle reaches the 11 o'clock position, DEPRESS and HOLD the Diesel Generator 1B AUTO SYNC PERMISSIVE Pushbutton 1PB-DG1B. ________

b. When the DG1B OUTPUT BRKR 1BA0319 closes, RELEASE the DG1B Auto Sync Permissive Pushbutton. ________

c. Verify proper kVAR loading by performing the following:

(1) Maintain kVAR POSITIVE and ≤ half of the kW load,

(2) **IF** the kVAR loading goes negative and NO adjustment can be made with voltage control:

(a) Trip open the DG output breaker 1BA0319,

(b) Re-parallel beginning with step B5.2.22,

(c) Notify the System Engineer.

B5.2.32 PLACE the BRKR 1BA0319 Synchronizing Switch to OFF. ________

CAUTION

With the Diesel paralleled to the bus, depressing the Diesel Generator Speed Control Pushbuttons (Increase or Decrease) will shift the span of the DSL GEN 1B LOADING SET PT CONTROL, and the pot settings will no longer reflect 10% to 110% load. This shift can be nulled by using the Increase/Decrease Pushbuttons to match Diesel Generator load with current pot setting. Discontinuing parallel operation will automatically reset any bias that may have occurred.

NOTES

a. The Generator should be step loaded, using the Load Pot, in increments of approximately 1000 kW with 3 - 4 minutes between load changes.

b. As the generator voltage is adjusted, the kVAR should be maintained positive and ≤ half of the kW load. The System Engineer must approve for operation outside the VOGTLE ADMINISTRATIVE LIMITS in Figure 1.

c. DSL GEN 1B LOADING SET PT CONTROL, 1-SE-4916 has an adjustable range of 10% to 110% D/G load (700 kW to 7700 kW).

B5.2.33 ADJUST Generator load to 6800 - 7000 kW by gradually increasing the pot setting on DSL GEN 1B LOADING SET PT CONTROL, 1-SE-4916. ________

INITIALS

B5.2.34 ADJUST generator voltage within the following limits:

a. Maintain generator voltage between 4025 and 4326 volts. (CO 28422) ________

b. Maintain KVAR POSITIVE and ≤ half of the KW load, not to exceed limits per Figure 1. ________

c. If 1BA03 Bus voltage is ≥ 4326 volts:

CAUTION

Do NOT operate with Negative VARs.

(1) LOWER kVAR load until voltage is between 4025 and 4326 volts,

(2) REQUEST System Operator to adjust system voltage,

(3) If necessary, START additional loads on 1BA03 to bring voltage in required range.

d. If 1BA03 Bus voltage is ≤ 4025 volts:

(1) Raise kVAR load, not to exceed limit per Figure 1, until voltage is between 4025 and 4326 volts,

(2) REQUEST System Operator to adjust system voltage.

e. If voltage cannot be adjusted into the required range:

(1) Unload the Diesel Generator and remove it from service per steps B5.2.38 through 42,

(2) Initiate a Condition Report to have engineering evaluate motors powered from the bus and long term corrective action.

B5.2.35 RECORD the time at which Diesel Generator load exceeded 6800kW on Data Sheet 4. ________

INITIALS

B5.2.36 While DGIB is loaded EXAMINE the following and NOTE any problems:

a. Generator Sliprings and Brushes, ________

b. Generator Bearing Oil Rings, ________

c. Jacket Water System, ________

d. Lube Oil System, ________

e. Fuel Oil System, ________

f. Diesel engine intake and exhaust piping, ________

g. Combustion Air Header Drains (4). One valve at each end of both manifolds, ________

h. Visually INSPECT jacket water standpipe, pump suction and engine return piping for visible cracked welds or leakage. ________

B5.2.37 When Diesel Generator 1B has been fully loaded for 50 minutes complete section B of 11885-C, "Diesel Generator Operating Log". ________

INITIALS

NOTES

a. As generator load is adjusted, generator voltage should be adjusted concurrently to maintain kVAR load OUT (positive) and no more than one-half of the kW load.

b. The Generator should be unloaded in increments of approximately 1000 kW with 3 - 4 minutes between load changes.

c. Note the time at which load is reduced to less than 6800kW.

B5.2.38 When Diesel Generator 1B has been loaded to greater than 6800 kW for at least 1 hour:

a. REDUCE DSL GEN load using DSL GEN 1B LOADING SET PT CONTROL, 1-SE-4916, to approximately 700 kW while maintaining kVAR POSITIVE and ≤ half of the kW load. ________

b. RECORD the time load was reduced to less than 6800kW on Data Sheet 4. ________

B5.2.39 When minimum load is attained TRIP the DG1B OUTPUT BRKR 1BA0319. ________

INITIALS

NOTE

The Diesel Generator must idle for 30 seconds after the UNIT/PARALLEL Switch is placed in UNIT to ensure that the Governor Slow Start timer can time out and thus permit the Diesel Generator to Fast Start after shutdown. If the Diesel Generator is shutdown before the UNIT/PARA Switch has been placed in UNIT, the Diesel Generator will be inoperable from the time it is shutdown until 30 seconds after the UNIT/PARA Switch has been placed in UNIT.

B5.2.40 Momentarily PLACE the DSL GEN 1B UNIT/PARALLEL Switch 1-HS-4452B to UNIT and OBSERVE the blue DSL GEN 1B UNIT MODE/FAST START light is ON. ________

____
IV

B5.2.41 IDLE Diesel Generator 1B unloaded for 4-5 minutes. ________

B5.2.42 SHUT DOWN Diesel Generator 1B per Section B5.5.

INITIALS

B5.5 **DIESEL GENERATOR 1B SHUTDOWN**

B5.5.1 Observe and ENSURE the blue DG1B UNIT MODE/FAST START light is ON. ________

B5.5.2 At Panel QEAB, DEPRESS the DG1B STOP Pushbutton, 1-HS-4572B. ________

B5.5.3 RECORD the engine hours and time Diesel Generator 1B was shut down on the applicable Data Sheet (3 or 4). ________

B5.5.4 At 480V AC MCC 1NBO, VERIFY the Generator Space Heater is energized. ________

B5.5.5 VERIFY the Jacket Water Keep-Warm Pump starts. ________

B5.5.6 VERIFY the Lube Oil Keep-Warm Pump starts. ________

B5.5.7 After approximately two minutes, VERIFY the red stopping light at Panel PDG4 is off. ________

NOTE

Accumulated water must be drained from the Fuel Oil Day Tank per Technical Specification SR 3.8.1.5.

B5.5.8 If this test was performed as a regular monthly surveillance test or, if the Diesel Generator was operated for a period of one hour or greater, SAMPLE the Diesel Generator Diesel Fuel Oil (DFO) Day Tank for water:

a. OBTAIN a clear container one liter size or larger, ________

b. DRAIN a small amount of fuel oil into the container from the Day Tank Drain 1-2403-U4-036, ________

c. EXAMINE the sample for water on the bottom of the container, ________

d. If water is detected, REPEAT the sample until no water is found, ________

e. CLOSE, LOCK and CAP the Day Tank Drain Valve 1-2403-U4-036. ________

____
IV

INITIALS

B5.5.9 Shutdown Diesel Generator 1B Building ESF HVAC System and Align for Automatic operation by performing the following:

a. Stop DG1B Bldg ESF Supply Fan-2, 1-HS-12053A ______

b. Ensure ESF Supply Fan-2, 1-HS-12053A in AUTO ______

______ IV

c. Stop DG1B Bldg ESF Supply Fan-4, 1-HS-12054A ______

d. Ensure ESF Supply Fan-4, 1-HS-12054A in AUTO ______

______ IV

e. Ensure DG1B Bldg NON-ESF Supply Fan-6, 1-HS-12055 is in AUTO. ______

B5.5.10 COMPLETE the appropriate Data Sheet for DG1B.

a. DATA SHEET 3 for DG1B SLOW START per Section B5.1 ______

OR

b. DATA SHEET 4 for DG1B FAST START per Section B5.2 ______

A5.5.11 COMPLETE Completion Sheet 1 in the Diesel Generator Logbook. ______

B5.6 **SYSTEM RESTORATION**

B5.6.1 PERFORM Checklist 4 for Diesel Generator 1B. ______

B5.6.2 If any parameter recorded on 11885-C was out of range, INITIATE maintenance to investigate and repair as necessary.

B5.6.3 If either Air Compressor:

a. Fails to raise air receiver pressure to between 246 and 254 psig,

b. Displays air dryer prefilter indicator reading out of the green band,

INITIATE maintenance to repair the Air Compressor or clean prefilter(s).

INITIALS

B6.0 **DG1B ACCEPTANCE CRITERIA**

B6.1 The Diesel Generator starts and accelerates to at least 440 rpm with voltage and frequency between 4025 to 4330 volts and 58.8 to 61.2 Hz (when performing Section B5.1 only). ________

B6.2 The Diesel Generator starts and voltage and frequency are between 4025 to 4330 volts and 58.8 to 61.2 Hz within 11.4 seconds (when performing Section B5.2 only). ________

B6.3 The Diesel Generator operates with a load of 6800-7000 kW for at least 60 minutes. (Preceded by and immediately following the Diesel Generator start initiated by Section B5.1 or Section B5.2, the Diesel Generator operates with a load of 6800 to 7000 kW for at least 60 minutes.) Modes 1, 2, 3, or 4 only. ________

B6.4 At least one DFO Day Tank Transfer Pump automatically started and transferred fuel to the DFO Day Tank. ________

B6.5 The DFO Day Tank contains greater than 650 gallons of fuel, 52% on 1-LI-9019. ________

B6.6 The DFO Storage Tank contains greater than 68,000 gallons of fuel, 79% on 1-LI-9025. ________

B6.7 The pressure in at least one air start receiver is at least 210 psig. ________

B6.8 If the Diesel was operated for 60 minutes or more, the DFO Day Tank was sampled for water, and all water removed. ________

B6.9 Diesel Generator Lube Oil Sump Inventory greater than or equal to 336 gallons (Not less than ½ inch below max. static mark). ________

B7.0 **EVALUATION AND REVIEW OF DG1B OPERABILITY TEST**

B7.1 TEST PURPOSE

[ ] Surveillance: [ ] Monthly [ ] Semi-annual [ ] Both

[ ] Other (explain) ______________________________

B7.2 Results obtained through the performance of this procedure meet the ACCEPTANCE CRITERIA of Section B6.0.

[ ] YES [ ] NO

B7.2.1 NOTIFY the USS of the test results. If "NO" was checked and the failure was due to a Diesel Generator fault:

a. Evaluate the reason for failure,

b. Refer to Tech Spec LCO 3.8.1 and/or 3.8.2.

B7.3 Comments (include any abnormal conditions and corrective actions taken):______________________________

____

____

B7.3.1 Fill in the blanks: Section ____, Data Sheets ____, ____, ____ and Checklists _____ and _____ are not applicable and were deleted from THIS particular surveillance.

Test Completed and USS Notified: ______________________________
Signature Date / Time

Supervisory Review: ______________________________
Signature Date / Time

The Following information sent to the Diesel Generator System Engineer:

a. A copy of Completion Sheet 1 from the Diesel Generator Logbook,

b. A copy of the completed 11885-C, "Diesel Generator Operating Log",

c. A copy of the completed Data Sheet used for this surveillance.

______________________ / __________
Admin Assistant Date

8.0	**REFERENCES**	
8.1	**FSAR**	
8.1.1	Technical Specification LCO 3.8.1	
8.1.2	Technical Specification LCO 3.8.2	
8.1.3	FSAR 8.3.1.3	
8.1.4	FSAR 9.5.4.4	
8.1.5	FSAR 9.5.5.3	
8.1.6	FSAR 9.5.5.4	
8.1.7	FSAR 9.5.6.4	
8.1.8	FSAR 9.5.8.4	
8.1.9	FSAR 1.9.108	Reg Guide 1.108
8.2	**PROCEDURES**	
8.2.1	13145-1	"Diesel Generators"
8.2.2	00404-C	"Surveillance Test Tracking Program"
8.2.3	11885-C	"Diesel Generator Operating Log"
8.2.4	13325-1	"Auxiliary Feedwater Pumphouse And Diesel Generator Building HVAC Systems"
8.2.5	54169-C	"Diesel Generator Miscellaneous Trending And Evaluation"
8.3	**P&IDs**	
8.3.1	1X4DB170-1	Diesel Generator - Train A
8.3.2	1X4DB170-2	Diesel Generator - Train B
8.4	**ELECTRICAL DIAGRAMS**	
8.4.1	1X3D-AA-K01A	Diesel Generator Relay And Metering Diagrams
8.4.2	1X3D-AA-D02A	Swgr 1AA02
8.4.3	1X3D-AA-D02B	Swgr 1AA02

8.4.4	1X3D-AA-D03A	Swgr 1BA03
8.4.5	1X3D-AA-D03B	Swgr 1BA03
8.5	**ELEMENTARY DIAGRAMS**	
8.5.1	1X3D-BA-D02G	Breaker 1AA02-19
8.5.2	1X3D-BA-D03D	Breaker 1BA03-19
8.6	**LOGIC DIAGRAMS**	
8.6.1	1X5DN107-1	Diesel Fuel Oil System
8.6.2	1X5DN107-2	Diesel Generator Engine
8.6.3	1X5DN107-3	Diesel Generator Excitation
8.6.4	1X5DN107-4	Diesel Generator Engine Auxiliaries
8.6.5	1X5DN107-5	Diesel Generator Engine Auxiliaries
8.7	**TECHNICAL MANUALS**	
8.7.1	AX4AK01-509	Diesel Engine Technical Manual
8.7.2	AX4AK01-563	Diesel Generator Associated Publications Manual Vol 1
8.7.3	AX4AK01-564	Diesel Generator Associated Publications Manual Vol 2

END OF PROCEDURE TEXT

GENERATOR 8750 KVA, 4160V
1214.4A 60 HZ 0.8 PF
FREQUENCY 60HZ
MODEL NO. 72 12500 100

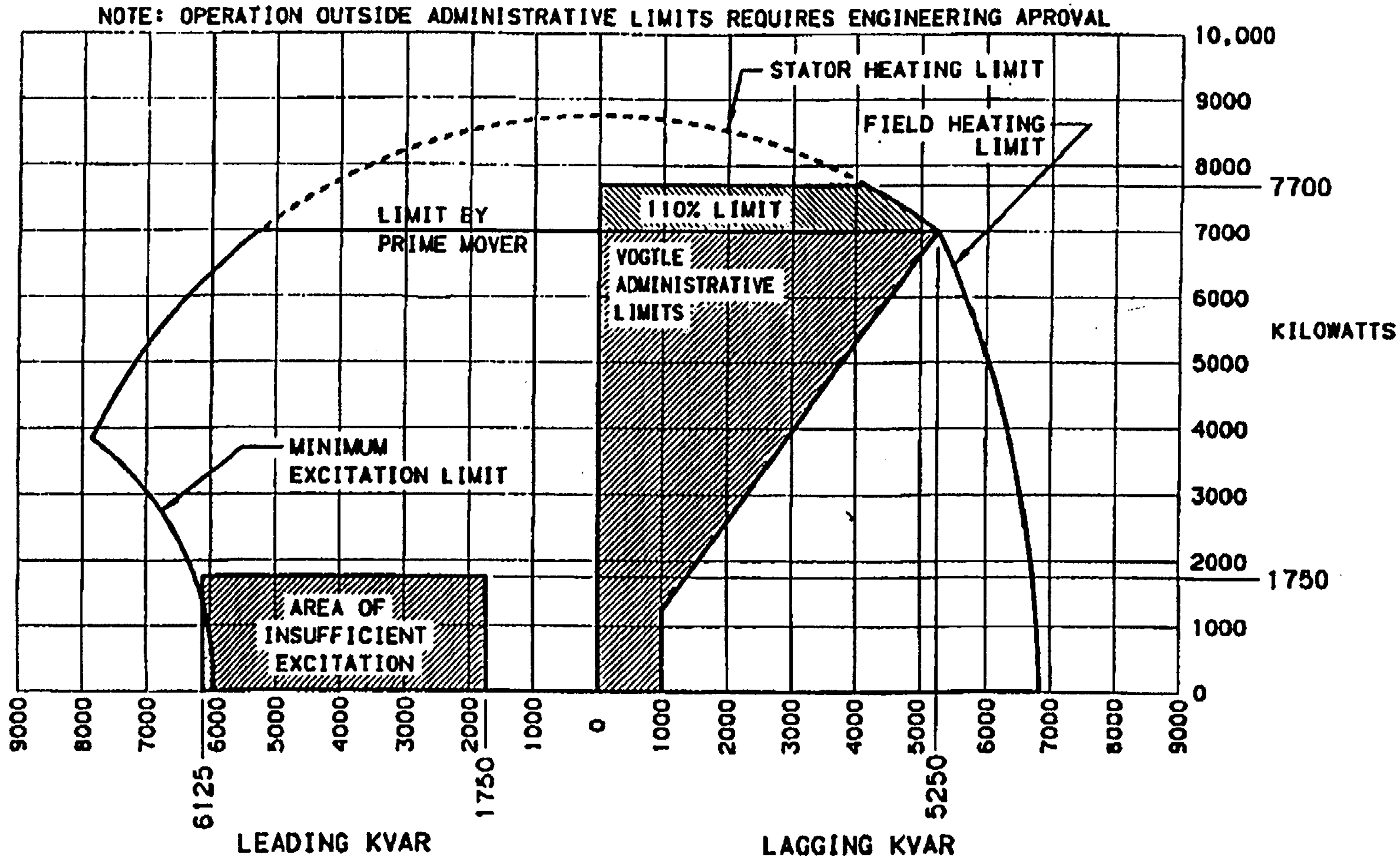

FIGURE 1

EMERGENCY DIESEL GENERATOR
OPERATING LIMITS

DATA SHEET 4

DG1B FAST START SURVEILLANCE DATA

Date: __________ Mode: _______

B5.2.2 Engine Hours at Startup: ____________________

B5.2.4 Voltage Regulator Selected: ____________________

B5.2.5 Air Start Receiver pressure(s): 1-PI-9053 ____________

1-PI-9057 ____________

B5.2.12 Time Diesel Started: ____________________

B5.2.17 Air Start Receiver pressure(s): 1-PI-9053 ____________

1-PI-9057 ____________

B5.2.18 Time to voltage: ___________ Time to 450 rpm: ____________

Time to frequency: ______________

B5.2.19 Voltage: A-B ___________ B-C _____________ C-A ___________

Frequency: ______________Hz Speed: ______________rpm

B5.2.35 Time load exceeded 6800kW: ____________________

B5.2.38.2 Time load reduced to less than 6800kW: ____________________

B5.5.2 Time Diesel Shutdown: ____________________

B5.5.3 Diesel Engine Hours at Shutdown ____________________

B5.6 System Restoration

DFO Storage Tank Level 1-LI-9025: __________________ %

DFO Day Tank Level 1-LI-9019: __________________ %

Air Start Receiver 1 Pressure 1-PI-9061: __________________ psig

Air Start Receiver 2 Pressure 1-PI-9065: __________________ psig

Lube Oil Sump Inventory greater than or equal to 336 gallons (Not < ½ inch below max. static mark). ________________ (initial)

CHECKLIST 3

DG1B

CYLINDER MOISTURE CHECK INDEPENDENT VERIFICATION

COMPONENT	DESCRIPTION	POSITION	INITIALS
1-2403-X4-724	AIR RECEIVER #1 TO ENG BARR DEVICE	CLOSED	____/____ IV
1-2403-U4-131	TURBO LUBE OIL ORIFICE BYPASS	CLOSED	____/____ IV
1-HS-4517	LOCAL/REMOTE	REMOTE	____/____ IV
	FUEL SHUTDOWN CYLINDER	FULLY RETRACTED	____/____ IV
	AIR SHUTDOWN CYLINDER	FULLY RETRACTED	____/____ IV
1-2403-X4-428	RIGHT BANK INTAKE MANIFOLD DRAIN	CLOSED	____/____ IV
1-2403-X4-432	RIGHT BANK INTAKE MANIFOLD DRAIN	CLOSED	____/____ IV
1-2403-X4-426	LEFT BANK INTAKE MANIFOLD DRAIN	CLOSED	____/____ IV
1-2403-X4-430	LEFT BANK INTAKE MANIFOLD DRAIN	CLOSED	____/____ IV
CYLINDER PETCOCKS ON EACH CYLINDER		CLOSED	____/____ IV

Performed By: ______________________ ____________ Date ________ Time

Verified By: ______________________ ____________ Date ________ Time

Reviewed By: ______________________ SS or USS ____________ Date ________ Time

CHECKLIST 4

DG1B STANDBY MODE STATUS CHECK

ENGINE CONTROL PANEL - PDG4	STATUS	INITIALS	IV
1. All annunciator windows	No unexpected alarms	______	
2. Starting Air Pressure:			
a. Left Bank 1-PI-9057	220-255 psig	______	
b. Right Bank 1-PI-9053	220-255 psig	______	
3. Control Air Pressure 1-PI-19175	55-65 psig	______	
4. UNIT AVAILABLE Light	ON	______	
5. Thermocouple Selector:			
a. Lubricating Oil In	142-170°F	______	
b. Lubricating Oil Out	142-170°F	______	
c. Jacket Water In	142-170°F	______	
d. Jacket Water Out	142-170°F	______	
6. POWER AVAILABLE Lights:			
a. A	ON	______	
b. B	ON	______	
c. C	ON	______	
7. STOPPING LIGHT	OFF	______	

DG1B STANDBY MODE STATUS CHECK

GENERATOR CONTROL PANEL - PDG3		STATUS	INITIALS	IV
1.	Unit/Parallel Switch 1-HS-4452A	CENTER AFTER UNIT	______	
1.	Local/Remote Switch 1-HS-4517	REMOTE	______	______
2.	Lockout Relays:			
	a. 186A	RESET	______	______
	b. 186B	RESET	______	______
	c. 186C	RESET	______	______
3.	Voltage Regulator Switch 1-HS-4912	SELECTED TO 1 or 2	______	______
4.	Exciter Permissive Switch 1-HS-4914	NORMAL	______	______

MOTOR CONTROL CENTER 1NBO			
1.	Air After Cooler Fan No. 1	AUTO	______
2.	Air Compressor No. 1	AUTO	______
3.	Air After Cooler Fan No. 2	AUTO	______
4.	Air Compressor No. 2	AUTO	______
5.	Jacket Water Circulating Pump	AUTO	______
6.	Jacket Water Heater	AUTO	______
7.	Lube Oil Circulating Pump	AUTO	______
8.	Lube Oil Heater	AUTO	______
9.	Generator Space Heater	AUTO	______

CHECKLIST 4

DG1B STANDBY MODE STATUS CHECK

DIESEL GENERATOR SKID - DG1B		STATUS	INITIALS	IV
1.	Governor Settings			
	Speed Droop	Sealed *	________	________
	Load Limit	Sealed *	________	________
	Speed	Sealed *	________	________
	Oil Level	Sight glass at or near full	________	________

* If seal is not intact, ENSURE setting is as recorded in 11885-C, Section A, "Diesel Generator Pre-startup Readings." NOTIFY Maintenance Duty Supervisor of broken seal and have governor setting resealed. RECORD this action in the comments section for this checklist.

		STATUS	INITIALS	IV
2.	Overspeed Trip Air Press (Located under right bank Turbocharger)	55-80 psig	________	
3.	Lube Oil Level - Dipstick	MAX STATIC +1.5"/-.5"	________	(Note 1)
4.	Jacket Water Keep-Warm Pressure 1-PI-19134	15-35 psig	________	
5.	Lube Oil Keep-Warm Pressure 1-PI-19152	25-50 psig	________	
6.	Run/Stop Switch 1-HS-4689	PULL-TO-RUN	________	________
7.	Generator Bearing Oil Level	Centerline of sight glass or above	________	
8.	Turbocharger Bearings			
	a. Right Bank Sight Glass	Visible	________	
	b. Left Bank Sight Glass	Visible	________	

UPSTAIRS

		STATUS	INITIALS
1.	Intake Air Filter		
	a. Screens	Unobstructed	________
	b. Oil Level Sight Glass	Half Full	________
2.	Exhaust Silencer Room	No Unauthorized Combustibles in Room	________

Note 1 - If less than negative .5" below MAX STATIC, have USS verify availability of adequate lube oil in the warehouse to restore level or reference Tech Spec 3.8.3. See REA 96-VAA053.

CHECKLIST 4

DG1B STANDBY MODE STATUS CHECK

		STATUS	INITIALS	IV
ELECTRICAL CONTROL PANEL QEAB - MAIN CONTROL ROOM				
1.	DSL GEN 1B UNIT/PARALLEL Switch 1-HS-4452B	NORMAL AFTER UNIT	______	______
2.	SYNC MODE SELECTOR Switch 1-TS-DG1B	AUTO	______	______
3.	DG1B OUTPUT RKR 1-HS-1BA0319	AUTO	______	______
4.	DFO DAY TANK LEVEL 1-LI-9019	52-100%	______	______
4160V AC SWGR 1BA03 - CONTROL BLDG LVL A				
1.	1BA03-19 15A BKR BREAKER CONTROL	CLOSED	______	______
2.	EMERGENCY DG1B INC BRKR	RACKED IN	______	______
3.	CHARGING MOTOR POWER SWITCH ON AND CLOSING SPRINGS CHARGED	ON/CHARGED	______	______
4.	DIESEL GENERATOR BRKR CONTROL SELECT SWITCH 1-HS-1BA0319B	CONT RM	______	______

Comments: ____

____

____

____

Completed By: ______________________ ______________ ______________
Signature Date Time

Reviewed By: ______________________ ______________ ______________
Signature Date Time

Facility: __VOGTLE___________ Scenario No.: ___1_____ Op-Test No.: _______

Examiners: _R. Baldwin ____ Operators: ____________________
_B. Holbrook________ ____________________
_M. Sykes__________ ____________________

Objectives: The crew members should respond to failures in accordance with plant procedures and guidelines

Initial Conditions: IC 14 (100% - Reduce to 90%), Override C panel reactor trip handswitch, , ~9 GPD on S/G # 2 (SG-01b @0.001%). AF02A MDAFW-B trips on start.

Turnover: 90% power with power ascension in progress.. Motor Driven AFW "A" is OOS for bearing replacement 16 hours into the 72 hour action statement. Repair to be completed in 4 hours. , #4 SG ARV OOS (INFO LCO), ~9 GPD tube leak on # 2 S/G, tornado warning for Burke county, procedure 11889-C, "Severe Weather Checklist," has been completed. # 4 steam line radiation monitor (RE-13119) OOS (30 days to restore).

Event No.	Malf. No.	Event Type*	Event Description
1	FW02c (100% Ramp in over 120 sec)	I/BOP/ SRO	Feed Flow transmitter failure high on # 3 S/G (1FT-530A). This will be a slow failure to allow time for the operator to find and analyze the problem.
2	NI07a	I/RO/ SRO	Power range Upper Detector fails LOW. Procedure 18002-C, Nuclear Instrumentation System Malfunction, Section D. Power Range Drawer N41 Malfunction. RODS need to be IN AUTO
3	CV15	C/N/ RO/ SRO	Failure of TE-15214C will cause valve HV-15214 to close due to a CVCS pipe break room protection actuation. The pipe break actuation annunciator will alarm and the temperature indicator for TE-15214C will indicate high. Valve HV-15214 will isolate normal letdown, however letdown will continue thru the Letdown relief until the orifice isolation valves are closed. The crew should place excess letdown in service.
4	FW01A Overrid e Load Setbac k ckt)	C/BOP/ R/RO/ SRO	SG Feed water pump trip. With a failure of the load setback circuitry. Manual load reduction will function. Use procedure 18016-C, Section "A", MFP(s) Malfunction. Must reduce turbine load to within the capacity of one main feed pump (approx. 70% reactor power). This will be a reactivity evolution for the RO candidate and the component evolution for the BOP candidate.

Facility: __VOGTLE___________ Scenario No.: ___1_____ Op-Test No.: _______

Examiners: _R. Baldwin ____ Operators: ____________________
_B. Holbrook________ ____________________
_M. Sykes__________ ____________________

Objectives: The crew members should respond to failures in accordance with plant procedures and guidelines

Initial Conditions: IC 14 (100% - Reduce to 90%), Override C panel reactor trip handswitch, , ~9 GPD on S/G # 2 (SG-01b @0.001%). AF02A MDAFW-B trips on start.

Turnover: 90% power with power ascension in progress.. Motor Driven AFW "A" is OOS for bearing replacement 16 hours into the 72 hour action statement. Repair to be completed in 4 hours. , #4 SG ARV OOS (INFO LCO), ~9 GPD tube leak on # 2 S/G, tornado warning for Burke county, procedure 11889-C, "Severe Weather Checklist," has been completed. # 4 steam line radiation monitor (RE-13119) OOS (30 days to restore).

5	FW04C / FW06 (at 50%)	M/RO/ BOP/ SRO	# 3 Feed Reg valve Fails Closed. Once it is determined that the valve goes completely shut and a manual reactor trip has been inserted then insert FW06, Feed water line Rupture Inside Containment on line # 3. Override the manual reactor trip switch closest to the reactor operator (C Panel). The other reactor trip (B Panel) switch will operate. ***Remove the override immediately after the reactor trip***
	Override HS to off		Failure of one of the Containment coolers to shift to low speed. The low speed winding hand switch should be overridden to the stop position.
	AF02c		Turbine driven AFW pump will start but trip on overspeed and will not immediately be available. The trip should be inserted as soon as MSLI occurs.
	Override		Failure of one of the SI flow indicators. AS IS. (SIP-B FI-922)
			Loss of the B MDAFW due to short in motor windings
			Classified as a Site area Emergency. Potential Loss of both barriers. Fuel Clad and RCS barriers.

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

Op-Test No.: _____ Scenario No.: _____ Event No.: __1__

Event Description: Feed Flow transmitter failure HIGH on # 3 S/G (1FT-530A). This will be a slow failure to allow time for the operator to find and analyze the problem.

Time	Position	Applicant's Actions or Behavior
	BOP	Recognize Annunciators on ALB 13 C-1 STM GEN 3 FLOW MISMATCH 17013-1 C-6 STM GEN HI/LO LVL DEVIATION
		Reviews 17013-1 p. 15 of 30 Goes to 180001-C, Primary Systems Instrument Malfunction, Section G. Failure of Steam Generator Flow Instrumentation.
		Reports to SRO that SG level deviation.
		Step G.1 RNO Takes manual control of the MFRV #3 and both MFPs speed
		Selects unaffected control channel.
		Returns feed flow and MFP(s) speed to automatic.
		Verifies that SG level control maintains NR level at 65%.
	SRO	Receives report from BOP and RO of malfunction.
		Enters AOP 18001 section G. Directs BOP to take manual control of the # 3 SG MFRV and manual control of MFP(s).
		The failed channel is removed from service, then the MFPs and MFRV #3 is returned to automatic.
	RO	Observes primary plant conditions and supports BOP, reading ARPs.
	SRO	Contacts Maintenance
		Contacts Operations Duty Manager

Op-Test No.: _____ Scenario No.: __1___ Event No.: __2__

Event Description: Power range Upper Detector fails **LOW**. Procedure 18002-C, Nuclear Instrumentation System Malfunction, Section D. Power Range Drawer **N41** Malfunction. **RODS need to be IN AUTO**

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and Reports Annunciators: ALB 10 C-2 POWER RANGE CHANNEL DEVIATION E-3 OVERTEMP ΔT ROD BLOCK AND RUNBACK ALERT ALB 10 A-6 OVERTEMP ΔT ALERT Bistables TOΔT Trip and TOΔT Runback for Channel 1.
		Performs IOA of 18002-C, Nuclear Instrumentation System Malfunction. Section B. Diagnoses the failed N41 upper detector failure and Places Control Rods in Manual.
		Terminates Load change in progress.
	SRO	Receives report from RO of N41 malfunction.
		Enters 18002-C, Nuclear Instrumentation System Malfunction. Section B.
		Directs RO to place Rods in Manual.
		Directs BOP to Perform Step B.3
	BOP	Terminates any load changes in progress.

Op-Test No.: _____ Scenario No.: __1___ Event No.: __2__

Event Description: Power range Upper Detector fails **LOW**. Procedure 18002-C, Nuclear Instrumentation System Malfunction, Section D. Power Range Drawer **N41** Malfunction. **RODS need to be IN AUTO**

	BOP	Performs Step B.3 a. Selects the affected channel on: ● ROD STOP BYPASS switch ● COMPARATOR CHANNEL DEFEAT switch ● POWER MISMATCH BYPASS switch ● UPPER SECTION switch ● LOWER SECTION switch. b. Reset rate trip.
	RO	Restore Tavg to program.
	SRO	Directs RO to place rods in AUTO if desired. Directs RO select an operable PR on N-45.
		Notifies I&C Department to initiate repairs.
		BYPASS affected channel IAW 13509-C Bypass Test Instrumentation (BTI) Panel, if desired.
		Within one hour, verify interlock is in required state for TS 3.3.1-1 function 16 c, d, e. Have 6 hours to pull control power fuses. (Follow up if necessary)
		TS 3.2.4.2, QPTR,
	RO	Places rods to AUTO if directed Selects an Operable PR on N-45.

Op-Test No.: _____ Scenario No.: __1___ Event No.: __3__

Event Description: Failure of TE-15214C will cause valve HV-15214 to close due to a CVCS pipe break room protection actuation. The pipe break actuation annunciator will alarm and the temperature indicator for TE-15214C will indicate high. Valve HV-15214 will isolate normal letdown, however letdown will continue thru the Letdown relief until the orifice isolation valves are closed. The crew should place excess letdown in service.

Time	Position	Applicant's Actions or Behavior
	RO/BOP	Responds to alarm for CVCS pipe break protection actuation. Recognizes and Report the following annunciators: ALB-063 E-1, CVCS PIPE BREAK RM PROT ACTUATION. ALB-07 C-5 LP LTDN RELIEF HI TEMP.
	BOP	Reads ARP 17063-1, p. 23 of 29. Verifies that HV -15214 closes. . Identifies problem temperature element. Use HS-15214B and select position 4, (R-A09) PP PEN RM. TE-25214
	SRO	Acknowledges report of alarm E-1 of ALB-063. Dispatches an operator to investigate Directs BOP to align both temp switches to verify agreement between both elements in the same room.
		Directs RO to enter 18007-C, CVCS System Malfunction. Section A
		Directs RO to enter SOP-1308, CVCS Excess letdown.
	BOP/RO	Identifies TE-25214 has failed.
	RO	Identifies relief is lifting due to HV-15214 being closed. Isolates letdown and places excess letdown in service IAW 18007-C. Section A.

Op-Test No.: _____ Scenario No.: __1___ Event No.: __3__

Event Description: Failure of TE-15214C will cause valve HV-15214 to close due to a CVCS pipe break room protection actuation. The pipe break actuation annunciator will alarm and the temperature indicator for TE-15214C will indicate high. Valve HV-15214 will isolate normal letdown, however letdown will continue thru the Letdown relief until the orifice isolation valves are closed. The crew should place excess letdown in service.

		A.1 Check CVCS letdown flow path. a. Goes to RNO to close 459, 460 and the in service orifice isolation valve.
	RO	Continues through procedure 18007-C, at step A.5 the RO will initiate Excess letdown IAW SOP-13008, CVCS Excess Letdown.
		4.1.1 ENSURE that a CVCS Charging Pump is running
		4.1.2 ENSURE CLOSED Reactor Head Vent To Excess Letdown Isolation 1-HV-8098.
		4.1.3 ENSURE Excess Letdown Heat Exchanger Discharge 1-HC-0123 is set to closed. 4.1.4 ENSURE OPEN RCPs Seal Leakoff Isolations 1-HV-8100 and 1-HV-8112. 4.1.5 ENSURE Excess Letdown To VCT 1-HS-8143 is in the OPEN VCT position. 4.1.6 OPEN Excess Letdown Line Isolations 1-HV-8153 and 1-HV-8154.
		4.1.7 NOTE Excess Letdown Heat Exchanger Pressure 1-PI-0124 and Excess Letdown Heat Exchanger Discharge Temperature 1-TI-0122.

Op-Test No.: _____ Scenario No.: __1___ Event No.: __3__

Event Description: Failure of TE-15214C will cause valve HV-15214 to close due to a CVCS pipe break room protection actuation. The pipe break actuation annunciator will alarm and the temperature indicator for TE-15214C will indicate high. Valve HV-15214 will isolate normal letdown, however letdown will continue thru the Letdown relief until the orifice isolation valves are closed. The crew should place excess letdown in service.

		4.1.8 MONITOR 1-PI-0124 and 1-TI-0122 and slowly RAISE Excess Letdown Heat Exchanger Discharge 1-HC-0123 output to establish maximum allowable flow. 4.1.9 ADJUST charging and/or seal injection as required to maintain desired pressurizer level. 4.1.10 If normal letdown is isolated, ALIGN the outlet of the Seal Water Heat Exchanger to the Volume Control Tank spray nozzle as follows; independent verification required: a. UNLOCK and OPEN Seal Water Return Heat Exchanger Outlet To Volume Control Tank 1-1208-U6-104, b. CLOSE Seal Water Return Heat Exchanger Outlet To Positive Displacement Charging Pump Suction Header 1-1208-U6-106.

Op-Test No.: _____ Scenario No.: __1___ Event No.: __3__

Event Description: Failure of TE-15214C will cause valve HV-15214 to close due to a CVCS pipe break room protection actuation. The pipe break actuation annunciator will alarm and the temperature indicator for TE-15214C will indicate high. Valve HV-15214 will isolate normal letdown, however letdown will continue thru the Letdown relief until the orifice isolation valves are closed. The crew should place excess letdown in service.

		4.2.7 If desired to transfer excess letdown to the VCT, PERFORM the following: a. ENSURE that a CVCS Charging Pump is running, b. ENSURE OPEN RCP Seal Leakoff Isolations 2-HV-8100 and 1-HV-8112, c. PLACE Excess Letdown To VCT 1-HS-8143 to the OPEN VCT position, **NOTES** a. Pressure rise at 1-PI-0124 should be limited to less than 50 psi to limit the backpressure on the seals. b. Heat Exchanger outlet temperature should not exceed 165°F. d. MONITOR 1-PI-0124 and 1-TI-0122 and <u>slowly</u> RAISE Excess Letdown Heat Exchanger Discharge 1-HC-0123 output to establish maximum allowable flow, e. ADJUST charging and/or seal injection as required to maintain desired pressurizer level.

Op-Test No.: _____ Scenario No.: __1___ Event No.: __3__

Event Description: Failure of TE-15214C will cause valve HV-15214 to close due to a CVCS pipe break room protection actuation. The pipe break actuation annunciator will alarm and the temperature indicator for TE-15214C will indicate high. Valve HV-15214 will isolate normal letdown, however letdown will continue thru the Letdown relief until the orifice isolation valves are closed. The crew should place excess letdown in service.

		4.2.8 If normal letdown is isolated, ALIGN the outlet of the Seal Water Heat Exchanger to the Volume Control Tank spray nozzle as follows; independent verification required: a. UNLOCK and OPEN Seal Water Return Heat Exchanger Outlet To Volume Control Tank 1-1208-U6-104, b. CLOSE Seal Water Return Heat Exchanger Outlet To Positive Displacement Charging Pump Suction Heater 1-1208-U6-106.
	SRO	Contacts Maintenance
		Contacts Operations Duty Manager evaluate continued operations. (Excess letdown is just about large enough to operate properly. Will need direction from the ODM and maybe the TSC)
		Looks at the Technical Requirements Manual at TMR 13.3.4 (Two to select from, 1 operable, 7 day LCO)

Op-Test No.: _____ Scenario No.: __1___ Event No.: __4__

Event Description: SG Feed water pump trip. With a failure of the load setback circuitry. Manual load reduction will function. Use procedure 18016-C, Section "A", MFP(s) Malfunction.

Must reduce turbine load to within the capacity of one main feed pump (approx. 70% reactor power). This will be a reactivity evolution for the RO candidate and the component evolution for the BOP candidate.

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes and Reports the following annunciators: ALB-015 D-3 MFPT A TRIPPED E-1 MFPT A HI VIB May receive ALB-10 C-4 ROD BANK LOW LIMIT
		Recognizes MFPT A trips. Perform actions of AOP - 18016-C, Condensate and Feedwater Malfunction. Section A. A.1 a power is greater than 75% A.1.b Check 2 MFPs running (NO) GO TO RNO Press START SETBACK PB on the Turbine control Panel. (THIS HAS BEEN DISABLED) Manually reduce RTP to 850 Mwe. Start a 3rd condensate pump.
	RO	A.1.b RNO. Ensure rapid insertion of control rods to match Tref to Tavg. Borate IAW SOP 13009, CVCS Reactor Makeup Control System. Section 4.7, Emergency Boration.

Op-Test No.: _____ Scenario No.: __1___ Event No.: __4__		
Event Description: SG Feed water pump trip. With a failure of the load setback circuitry. Manual load reduction will function. Use procedure 18016-C, Section "A", MFP(s) Malfunction. Must reduce turbine load to within the capacity of one main feed pump (approx. 70% reactor power). This will be a reactivity evolution for the RO candidate and the component evolution for the BOP candidate.		
		4.7.1 **Emergency Boration Through 1-HV-8104** 4.7.1.1 START one Boric Acid Transfer Pump. 4.7.1.2 ENSURE a Charging Pump is running. 4.7.1.3 OPEN EMERGENCY BORATE 1-HV-8104.

Op-Test No.: _____ Scenario No.: __1___ Event No.: __4__	
Event Description:	SG Feed water pump trip. With a failure of the load setback circuitry. Manual load reduction will function. Use procedure 18016-C, Section "A", MFP(s) Malfunction. Must reduce turbine load to within the capacity of one main feed pump (approx. 70% reactor power). This will be a reactivity evolution for the RO candidate and the component evolution for the BOP candidate.

		NOTES a. The following step assumes that with 12 gpm of seal return, 30 gpm will be supplied to the RCS. b. To ensure the required charging flow is maintained during emergency boration, either the charging pump controller, FIC-0121, or the PDP controller, 1-SIC-0459A, should be placed in manual and set to 42 gpm. 4.7.1.4 VERIFY Charging Flow 1-FI-0121C greater than 42 gpm. 4.7.1.5 VERIFY Emergency Boration Flow 1-FI-0183A greater than 30 gpm. 4.7.1.6 If flow is less than 30 gpm, START the second Boric Acid Transfer Pump. 4.7.1.7 OPERATE the Pressurizer Backup Heaters as necessary in order to equalize boron concentration between the RCS and the Pressurizer. 4.7.1.8 OBSERVE that plant conditions are consistent with the boration of the RCS: a. Rod motion outward if the control banks are in AUTO, b. RCS Tavg may be dropping, c. NIS may be dropping. 4.7.1.9 DETERMINE the amount of boric acid required to allow termination of emergency boration.

Op-Test No.: _____ Scenario No.: __1___ Event No.: __4__

Event Description: SG Feed water pump trip. With a failure of the load setback circuitry. Manual load reduction will function. Use procedure 18016-C, Section "A", MFP(s) Malfunction.

Must reduce turbine load to within the capacity of one main feed pump (approx. 70% reactor power). This will be a reactivity evolution for the RO candidate and the component evolution for the BOP candidate.

	SRO	**<u>Directs</u>** actions of AOP - 18016-C, Condensate and Feedwater Malfunction. Section A. A.1 a power is greater than 75% A.1.b Check 2 MFPs running (NO) GO TO RNO Press START SETBACK PB on the Turbine control Panel. (THIS HAS BEEN DISABLED) Manually reduce RTP to 850 Mwe. Start a 3rd condensate pump.
		Contacts Maintenance for MFP turbine
		Contacts Load Dispatcher
		Contacts I&C for set back circuitry.
		Directs BOP to RESET C.7

Op-Test No.: _____ Scenario No.: __1__ Event No.: __5__

Event Description: # 3 Feed Reg valve Fails Closed. Once it is determined that the valve goes completely shut and a manual reactor trip has been inserted then insert FW06, Feed water line Rupture Inside Containment on line # 3.

Override the manual reactor trip switch closest to the reactor operator (C Panel). The other reactor trip (B Panel) switch will operate. ***Remove the override immediately after the reactor trip.*** (*One containment cooler will not start in slow speed, the MDAFW pump B will trip on short in the motor windings and the TDAFW pump will trip on overspeed when the MSLI occurs.*)

Time	Position	Applicant's Actions or Behavior
	ALL	Identifies # 3 FRV is closing and will not respond to attempts to manually operate the valve. Crew determines that it is necessary to Manually trip the Reactor. (The closest trip switch to the RO WILL NOT work. If there is an attempt to do so it will not work. The other trip switch will work.)
	BOP	Attempt to operate the # 3 FRV in manual.
		Report to the SRO that manual control is not available. Recommend manual Reactor trip prior to the automatic reactor trip signal is generated.
	RO	Confer with the BOP operator and start reducing power to lessen the effects of the manual reactor trip.
		Recommend a manual Reactor trip prior to automatic trip signal.
		Attempt to manually trip the reactor from the closest reactor trip switch. When identified that this was not effective. Attempt to trip the Rx from the alternate switch.
	SRO	Receive reports from the BOP and RO.
		Direct the manual reactor trip prior to automatic trip signals are generated.

Op-Test No.: _____ Scenario No.: __1__ Event No.: __5__

Event Description: # 3 Feed Reg valve Fails Closed. Once it is determined that the valve goes completely shut and a manual reactor trip has been inserted then insert FW06, Feed water line Rupture Inside Containment on line # 3.

Override the manual reactor trip switch closest to the reactor operator (C Panel). The other reactor trip (B Panel) switch will operate. ***Remove the override immediately after the reactor trip.*** (*One containment cooler will not start in slow speed, the MDAFW pump B will trip on short in the motor windings and the TDAFW pump will trip on overspeed when the MSLI occurs.*)

		Enter E-0, Reactor Trip or Safety injection. After reactor trip.
	RO	Perform immediate operator actions of E-0. 1. Verify Rx trip: Rod bottom lights lit Reactor trip and bypass breakers OPEN Neutron Flux lowering.
	BOP	2. Verify turbine trip: All turbine stop valves SHUT 3. Verify power to AC emergency busses: 4160 AC 1E busses. AC emergency busses ALL ENERGIZED 4160 AC 1E busses. 480V AC 1E busses.

Op-Test No.: _____ Scenario No.: __1__ Event No.: __5__

Event Description: # 3 Feed Reg valve Fails Closed. Once it is determined that the valve goes completely shut and a manual reactor trip has been inserted then insert FW06, Feed water line Rupture Inside Containment on line # 3.

Override the manual reactor trip switch closest to the reactor operator (C Panel). The other reactor trip (B Panel) switch will operate. ***Remove the override immediately after the reactor trip.*** (*One containment cooler will not start in slow speed, the MDAFW pump B will trip on short in the motor windings and the TDAFW pump will trip on overspeed when the MSLI occurs.*)

	SRO	Direct actions of E-0,
		See attached copy of E-0
		At step 18 of E-0, Transition to 19231, FR.H-1, Respond to Loss of Secondary Heat Sink.
		Direct depressurization of plant at step 8 of FR–H.1 (use 455A) to less than 1950 psig. Establish condensate flow to the steam generators at step 8 d. **(Critical Task)**
		RESET SI and FWI and stub busses.
		A RED path will be received on Heat Sink
		Contact Maintenance for :MDAFW pump B and TDAFW Pump problems.
		Direct the RO to remove the RCPs from service when pressure is less than 1375 psig. **(Critical Task)**

Op-Test No.: _____ Scenario No.: __1___ Event No.: __5__

Event Description: # 3 Feed Reg valve Fails Closed. Once it is determined that the valve goes completely shut and a manual reactor trip has been inserted then insert FW06, Feed water line Rupture Inside Containment on line # 3.

Override the manual reactor trip switch closest to the reactor operator (C Panel). The other reactor trip (B Panel) switch will operate. ***Remove the override immediately after the reactor trip.*** (*One containment cooler will not start in slow speed, the MDAFW pump B will trip on short in the motor windings and the TDAFW pump will trip on overspeed when the MSLI occurs.*)

Time	Position	Applicant's Actions or Behavior
	RO	Trip the RCPs when pressure decreases below 1375 psig. Based on the fold out page. (Critical Task).
		Identify SI flow meter on B train, SIP-B FI-922. Has failed low.
		Identify the CNMT cooler failure to start in slow speed. Report and direct the BOP to start the fan in slow speed.
		At step 8 of FR-H.1 depressurize RCS to less than 1950 psig. At step 8.d depressurize Steam generators and establish condensate flow.
	BOP	Assist RO or perform Appendix C of E-0 to realign B Train ECCS pumps and valves.
		Start the CNMT cooler in slow speed.
	SRO	Classify Event as Site Area Emergency.
		Secure scenario after condensate flow has been established to one Steam Generator.

EMERGENCY OPERATING PROCEDURE

E-0 REACTOR TRIP OR SAFETY INJECTION

PURPOSE PRB REVIEW REQUIRED

This procedure provides actions to verify proper response of the automatic protection systems following manual or automatic actuation of a reactor trip or safety injection, to evaluate plant conditions, and to identify the appropriate recovery procedure. (Applicable in modes 1, 2 and 3)

SYMPTOMS

The symptoms are:

- Any symptom that requires a reactor trip, as listed in ATTACHMENT A, if it has not occurred.
- The following are symptoms of a reactor trip:
  - a. Any reactor trip annunciator lit.
  - b. Rapid lowering of neutron level indicated by nuclear instrumentation.
  - c. All shutdown and control rods fully inserted (rod bottom lights lit).
- The following are symptoms that require a reactor trip and safety injection, if one has not occurred:
  - a. PRZR pressure less than or equal to 1870 psig.
  - b. Steamline pressure less than or equal to 585 psig.
  - c. Containment pressure greater than or equal to 3.8 psig.
- The following are symptoms of a reactor trip and safety injection:
  - a. Any SI annunciator lit.
  - b. SI ACTUATED BPLB window lit.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

IMMEDIATE OPERATOR ACTIONS

NOTE: Foldout page should be continuously monitored and applicable actions taken.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. Verify reactor trip: • Rod bottom lights-LIT. • Reactor trip and bypass breakers-OPEN. • Neutron flux-lowering.	1. Trip reactor using both reactor trip handswitches on the QMCB. IF reactor NOT tripped, THEN go to 19211-C, FR-S.1 RESPONSE TO NUCLEAR POWER GENERATION/ATWT.
2. Verify turbine trip: • All turbine stop valves - SHUT.	2. Trip turbine. IF turbine will NOT trip, THEN run back turbine. IF turbine cannot be run back, THEN shut main steam line isolation valves and bypass valves.
3. Verify power to AC emergency busses:	
a. AC emergency busses - AT LEAST ONE ENERGIZED: • 4160V AC 1E busses.	a. Try to restore power to at least one AC emergency bus. IF power can NOT be restored to at least one AC emergency bus, THEN go to 19100-C, ECA-0.0 LOSS OF ALL AC POWER.
b. AC emergency busses - ALL ENERGIZED: • 4160V AC 1E busses. • 480V AC 1E busses.	b. Try to restore power to de-energized AC emergency bus while continuing with Step 4.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. Check if SI is actuated: • Any SI annunciator - LIT. • SI ACTUATED BPLB window - LIT.	4. Check if SI is required: IF one or more of the following conditions has occurred: • PRZR pressure less than or equal to 1870 psig. • Steam line pressure less than or equal to 585 psig. • Containment pressure greater than or equal to 3.8 psig. • Automatic alignment of ECCS equipment to injection phase. THEN SI is required. IF SI is required, THEN actuate. IF SI is NOT required, THEN go to 19001-C, ES-0.1 REACTOR TRIP RESPONSE.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
SUBSEQUENT OPERATOR ACTIONS	
5. Verify FW Isolation: • MFIVs - SHUT. • BFIVs - SHUT. • MFRVs - SHUT. • BFRVs - SHUT.	5. Shut valves as necessary.
6. Verify MLB indications for both trains of ECCS equipment aligning for injection phase.	6. Actuate SI.
7. Verify containment isolation Phase A - ACTUATED: a. CI-A MLB indicators - CORRECT FOR SI.	7. Actuate Phase A. IF valves do not shut, THEN shut valves.
8. Verify AFW pumps running:	
a. MDAFW pumps - RUNNING.	a. Start pumps.
b. SG blowdown isolated: • SG blowdown isolation valves - SHUT WITH HANDSWITCHES IN CLOSE. • SG sample isolation valves - SHUT.	b. Shut valves.
c. Turbine-driven pump - RUNNING IF ANY OF THE FOLLOWING CONDITIONS EXISTS: • LO-LO LEVEL IN TWO OR MORE SGs. • BLACKOUT.	c. Open TDAFW pump steam supply valve HV-5106.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. Check charging and other ECCS pumps:	
a. Verify ECCS pumps running: • CCPs - RUNNING. • SI Pumps - RUNNING. • RHR Pumps - RUNNING.	a. Start ECCS pumps.
b. (Unit 2 only) NCP - NOT RUNNING	b. (Unit 2 only) Trip the NCP if it is running.
10. Verify CCW Pumps - TWO RUNNING EACH TRAIN.	10. Start or stop pumps to ensure two pumps running on each train.
11. Verify NSCW Pumps - TWO RUNNING EACH TRAIN.	11. Start or stop pumps to ensure two pumps running on each train.
12. Verify containment cooling units:	
a. Fans - RUNNING IN LOW SPEED: • MLB indicators - CORRECT FOR SI.	a. Start fans in low speed.
b. NSCW cooler isolation valves - OPEN: • MLB indicators - CORRECT FOR SI.	b. Open valves.
13. Verify containment ventilation isolation:	
a. Dampers and valves - SHUT: • MLB indicators - CORRECT FOR SI.	a. Shut dampers and valves.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14. Check if main steamlines should be isolated:	
a. Check one or more of the following conditions: • Any steamline pressure - EQUAL TO OR LESS THAN 585 PSIG. • Containment pressure by recording - GREATER THAN 14.5 PSIG. • Low Steam Pressure SI/SLI - BLOCKED <u>AND</u> High Steam Pressure Rate - ON TWO OR MORE CHANNELS OF ANY STEAMLINE.	a. Go to Step 15.
b. Verify main steamline isolation and bypass valves - SHUT.	b. Shut valves.
15. Check containment spray - NOT REQUIRED:	
a. Containment pressure - HAS REMAINED LESS THAN 21.5 PSIG BY PRESSURE RECORDING.	a. Perform the following: 1) Verify containment spray initiated. <u>IF NOT</u>, <u>THEN</u> actuate. 2) Verify containment spray pumps running. 3) Verify containment spray pump discharge valves open.
16. Verify diesel generators - RUNNING.	16. Start both DGs.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION: Evacuate non-essential personnel from containment if conditions warrant.

17. Verify ECCS flows:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
a. CCP flow indicators - CHECK FOR BIT FLOW.	a. Align valves using ATTACHMENT B.
b. RCS pressure - LESS THAN 1625 PSIG.	b. Go to Step 18.
c. SI pump flow indicators - CHECK FOR FLOW.	c. Align valves using ATTACHMENT C.
d. RCS pressure - LESS THAN 300 PSIG.	d. Go to Step 18.
e. RHR pump flow indicators - CHECK FOR FLOW.	e. Align valves using ATTACHMENT D.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE:

- The generator output breakers should trip open approximately 30 seconds after a turbine trip.
- If breakers do not trip open, refer to actions of 17031, Window E04.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*18. Verify total AFW flow - GREATER THAN 570 GPM.	*18. IF SG NR level in any SG greater than 10% [32% ADVERSE], THEN control feed flow to maintain NR level. Continue with Step 19. IF NR level in all SGs less than 10% [32% ADVERSE], THEN start pumps and align valves as necessary. IF NR level in all SGs less than 10% [32% ADVERSE], AND total AFW flow greater than 570 gpm can NOT be established, THEN go to 19231-C, FR-H.1 RESPONSE TO LOSS OF SECONDARY HEAT SINK.
19. Verify ECCS valve alignment - PROPER INJECTION LINEUP INDICATED ON MLBs.	19. Align valves using Attachments B, C and D as necessary.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*20. Verify RCS temperatures - • Any RCP running - VERIFY RCS AVERAGE TEMPERATURE STABLE AT OR TRENDING TO 557° F. -OR- • No RCP running - VERIFY RCS COLD LEG TEMPERATURES STABLE AT OR TRENDING TO 557° F.	*20. <u>IF</u> temperature less than 557° F and lowering, <u>THEN</u> perform the following: a. Stop dumping steam. b. <u>IF</u> cooldown continues, <u>THEN</u> lower total feed flow. <u>IF</u> all SG NR levels less than 10% [32% ADVERSE], <u>THEN</u> maintain total feed flow greater than 570 gpm. c. <u>IF</u> cooldown continues, <u>THEN</u> perform one or more of the following to stop cooldown: • Trip both MFPs. • Shut MSIVs and BSIVs. <u>IF</u> temperature greater than 557° F and rising, <u>THEN</u>: • Dump steam to condenser. -OR- • Dump steam using SG ARVs.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION: A PRZR PORV block valve which was shut to isolate an excessively leaking or open PRZR PORV should not be opened unless used to prevent challenging the PRZR safeties.

21. Verify PRZR PORVs, block valves, and spray valves:

a. PRZR PORVs-SHUT AND IN AUTO.

a. IF PRZR pressure less than 2315 psig, THEN shut PRZR PORVs.

IF a PRZR PORV can NOT be shut, THEN shut its block valve.

IF block valve can NOT be shut, THEN go to 19010-C, E-1 LOSS OF REACTOR OR SECONDARY COOLANT.

Maintain RCS pressure less than 2400 psig to prevent lifting PRZR safeties.

NOTE: When PRZR pressure is greater than 2260 psig, PRZR spray is required. Spray valves should be shut if the associated RCP 4 or RCP 1 is not running to prevent loss of spray effectiveness.

b. Normal PRZR spray valves-shut.

b. IF PRZR pressure less than 2260 psig, THEN shut spray valves.

IF valves can NOT be shut, THEN stop RCP 4.

IF PRZR pressure continues lowering, THEN stop RCP 1.

c. Power to at least one block valve-AVAILABLE.

c. Go to step 22. OBSERVE NOTE PRIOR TO STEP 22.

d. PRZR PORV block valves-AT LEAST ONE OPEN.

d. IF RCS pressure is greater than 2185 psig, THEN open at least one PRZR PORV block valve.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE: Seal injection flow should be maintained to all RCPs.

*22. Check if RCPs should be stopped:	
a. Check ECCS pumps - AT LEAST ONE RUNNING: • CCPs or SI pumps.	a. Go to Step 23.
b. Check RCP trip parameter - RCS PRESSURE LESS THAN 1375 PSIG.	b. Go to Step 23.
c. Stop all RCPs.	
*23. Verify at least one ACCW pump - RUNNING.	*23. Try to start one ACCW pump. a. IF an ACCW pump can NOT be started within 10 minutes of loss of ACCW, THEN stop all RCPs. b. IF an ACCW pump can NOT be started within 30 minutes of loss of ACCW, THEN shut ACCW containment isolation valves: • ACCW SPLY HDR ORC ISO VLV HV-1979 • ACCW SPLY HDR IRC ISO VLV HV-1978 • ACCW RTN HDR IRC ISO VLV HV-1974 • ACCW RTN HDR ORC ISO VLV HV-1975

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
24. Check SGs secondary pressure boundaries:	
a. Check pressures in all SGs - • NO SG PRESSURE LOWERING IN AN UNCONTROLLED MANNER. • NO SG COMPLETELY DEPRESSURIZED.	a. Go to 19020-C, E-2 FAULTED STEAM GENERATOR ISOLATION.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION: The steam generator sample valves should be opened one at a time and shut prior to opening another sample valve.

25. Check secondary radiation - NORMAL:

    a. Open SG sample valves and direct chemistry to take periodic activity samples of all SGs:

SG	SAMPLE VALVE
• 1	HV-9451
• 2	HV-9452
• 3	HV-9453
• 4	HV-9454

    b. Secondary radiation - NORMAL:

    Response not obtained: b. Go to 19030-C, E-3 STEAM GENERATOR TUBE RUPTURE.

    1) MAIN STM LINE MONITORS:

    - RE-13120 (SG 1)
    - RE-13121 (SG 2)
    - RE-13122 (SG 3)
    - RE-13119 (SG 4)

    2) CNDSR AIR EJCTR/STM RAD MONITORS:

    - RE-12839C
    - RE-12839D*
    - RE-12839E*

    (* - if onscale)

    3) STM GEN LIQ PROCESS RAD:

    - RE-0019 (Sample)
    - RE-0021 (Blowdown)

    4) SG sample radiation.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
26. Check if RCS is intact inside containment: • Containment radiation - NORMAL. • Containment pressure - NORMAL. • Containment emergency recirculation sump levels - NORMAL.	26. Go to 19010-C, E-1 LOSS OF REACTOR OR SECONDARY COOLANT.
*27. Check if ECCS flow should be reduced:	
a. RCS subcooling - GREATER THAN 24° F.	a. Go to Step 28
b. Secondary heat sink: • Total AFW flow to SGs - GREATER THAN 570 GPM. -OR- • NR level in at least one SG - GREATER THAN 10%.	b. IF neither condition satisfied, THEN go to Step 28.
c. RCS pressure - STABLE OR RISING.	c. Go to Step 28.
d. PRZR level - GREATER THAN 9%.	d. Try to stabilize RCS pressure with normal PRZR spray. Return to Step 27a.
e. Go to 19011-C, ES-1.1 SI TERMINATION	
*28. Initiate monitoring of critical safety function status trees.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION: Switching to alternate CST by initiating 13610, AUXILIARY FEEDWATER SYSTEM will be necessary when CST level lowers to less than 15%.

NOTE: 91001, EMERGENCY CLASSIFICATION AND IMPLEMENTING PROCEDURE should be implemented at this time.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*29. Check SG levels:	
a. Check NR levels - GREATER THAN 10%.	a. IF all SGs NR levels less than 10%, THEN maintain total feed flow greater than 570 gpm.
b. Control feed flow to maintain NR levels between 10% and 65%.	b. IF NR level in any SG continues to rise in an uncontrolled manner, THEN go to 19030-C, E-3 STEAM GENERATOR TUBE RUPTURE.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
30. Check Auxiliary Building leak detection systems: a. Check PLANT VENT radiation monitors - NORMAL: • Plant vent monitors: • RE-12442A - EFFL PART • RE-12442B - EFFL IODINE • RE-12442C - EFFL RAD • RE-12444C - RADIOGAS RAD b. Check Auxiliary Building break detection system on PCP - NO LEAK DETECTION STATUS LIGHT LIT.	30. Evaluate cause of abnormal conditions. IF cause is loss of RCS inventory, THEN go to 19112-C, ECA-1.2 LOCA OUTSIDE CONTAINMENT.
31. Check PRT conditions - NORMAL: • PRZR PORV and safety valve tailpipe temperatures - LESS THAN 190° F. • Temperature - LESS THAN 115° F. • Level - BETWEEN 57% AND 88%. • Pressure - BETWEEN 3 PSIG AND 8 PSIG.	31. Evaluate cause of abnormal conditions using ATTACHMENT E. IF cause of abnormal conditions is a continuing loss of RCS inventory, THEN go to 19010-C, E-1 LOSS OF REACTOR OR SECONDARY COOLANT.

ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

CAUTION: If offsite power is lost after SI reset, action is required to restart the following ESF equipment if plant conditions require their operation:

- RHR Pumps
- SI Pumps
- Post-LOCA Cavity Purge Units
- Containment Coolers in low speed (Started in high speed on a UV signal).
- ESF Chilled Water Pumps (If CRI is reset).

32. Reset SI.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION: The steam generator sample valves should be opened one at a time and shut prior to opening another sample valve.

*33. Check secondary radiation - NORMAL:

a. Open SG sample valves and direct chemistry to take periodic activity samples of all SGs:

SG	SAMPLE VALVE
• 1	HV-9451
• 2	HV-9452
• 3	HV-9453
• 4	HV-9454

b. Secondary radiation - NORMAL.

RESPONSE NOT OBTAINED: b. Go to 19030-C, E-3 STEAM GENERATOR TUBE RUPTURE.

1) MAIN STM LINE MONITORS:

- RE-13120 (SG 1)
- RE-13121 (SG 2)
- RE-13122 (SG 3)
- RE-13119 (SG 4)

2) CNDSR AIR EJCTR/STM RAD MONITORS:

- RE-12839C
- RE-12839D*
- RE-12839E*
  (* - if onscale)

3) STM GEN LIQ PROCESS RAD:

- RE-0019 (Sample)
- RE-0021 (Blowdown)

4) SG sample radiation.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
CAUTION: Repositioning Phase A isolation valves may cause radiation problems throughout the plant.	
34. Reset containment isolation Phase A.	34. Go to Step 36.
35. Establish instrument air to containment:	
a. Verify instrument air pressure - GREATER THAN 100 PSIG.	a. Start additional air compressors to establish instrument air pressure greater than 100 psig by initiating 13710, SERVICE AIR SYSTEM.
b. Open INSTR AIR CNMT ISO VLV HV-9378 using handswitches HS-9378A and HS-9378B.	
CAUTION: RCS pressure should be monitored. If RCS pressure lowers in an uncontrolled manner to less than 300 psig, the RHR pumps should be restarted to supply water to the RCS.	
*36. Check if RHR pumps should be stopped:	
a. Check RCS pressure:	
1) Pressure - GREATER THAN 300 PSIG.	1) Go to 19010-C, E-1 LOSS OF REACTOR OR SECONDARY COOLANT.
2) Pressure - STABLE OR RISING.	2) Go to Step 37.
b. Stop RHR pumps.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*37. Check if diesel generators should be stopped:	
a. Verify AC emergency busses - ENERGIZED BY OFFSITE POWER.	a. <u>WHEN</u> offsite power available, <u>THEN</u> restore power to Emergency AC busses by initiating 13427, 4160V AC ELECTRICAL DISTRIBUTION. <u>IF</u> offsite power <u>NOT</u> available, <u>THEN</u> restore power to 480V switchgear from the emergency DGs: <u>UNIT 1</u>: • 1NB01 • 1NB10 <u>UNIT 2</u>: • 2NB01 • 2NB10
b. Stop any unloaded DG and place in standby by initiating 13145, DIESEL GENERATORS.	
c. Verify 480V switchgear energized. <u>UNIT 1</u>: • 1NB01 • 1NB10 <u>UNIT 2</u>: • 2NB01 • 2NB10	c. Energize 480V switchgear. <u>UNIT 1</u>: • 1NB01 • 1NB10 <u>UNIT 2</u>: • 2NB01 • 2NB10

38. Return to Step 20.

END OF PROCEDURE TEXT

Sheet 1 of 2

ATTACHMENT A

SYMPTOMS REQUIRING REACTOR TRIP

	PARAMETER	SETPOINT
1.	Safety Injection	NA
2.	PR Neutron Flux High	
	a. High Setpoint	109%
	b. Low Setpoint (P-10 interlock)	25%
3.	PR Neutron Flux High Positive Rate	+5% in 2 sec.
4.	IR Neutron Flux High (P-10 interlock)	25%
5.	SR Neutron Flux High (P-6 interlock)	10^5 cps
6.	Overtemperature dT	Displayed on: TI-411C, TI-421C, TI-431C, TI-441C
7.	Overpower dT	Displayed on: TI-411B TI-421B TI-431B TI-441B
8.	Pressurizer Pressure Low (P-7 interlock)	1960 psig
9.	Pressurizer Pressure High	2385 psig
10.	Pressurizer Water Level High (P-7 interlock)	92%
11.	RCS Loss of Flow	
	a. Single Loop (P-8 interlock)	90%
	b. Two or More Loops (P-7 interlock)	90%

Sheet 2 of 2

ATTACHMENT A (Cont'd)

SYMPTOMS REQUIRING REACTOR TRIP

	PARAMETER	SETPOINT
12.	Reactor Coolant Pump Bus Undervoltage (P-7 interlock)	9600V
13.	Reactor Coolant Pump Bus Underfrequency (P-7 interlock)	57.3 Hz
14.	Steam Generator Water Level Lo-Lo	38% NR
15.	Turbine Trip (P-9 interlocks)	
	a. Turbine Stop Valve Closure	Less Than 96.7% Open
	b. Emergency Trip System Pressure Low	580 psig
16.	Solid State Protection System Malfunction	General Warning Alarm, Both Trains

END OF ATTACHMENT A

Sheet 1 of 2

ATTACHMENT B

VALVE LINEUP FOR CCP COLD LEG INJECTION THROUGH THE BIT

VALVE NUMBER	FUNCTION	POSITION	POSITION INDICATION
1204-U4-207	RWST SUPPLY TO ECCS	OPEN	LOCAL (RWST)
LV-112D	RWST TO CCP A&B SUCTION	OPEN	MLB09
LV-112E	RWST TO CCP A&B SUCTION	OPEN	MLB10
LV-112B	VCT OUTLET ISOLATION	SHUT	MLB05
HV-8471A	CCP-A SUCTION	OPEN	MLB01
HV-8509B	CCP-A RV TO RWST ISOLATION	OPEN	MLB04
HV-8509A	CCP-B RV TO RWST ISOLATION	OPEN	MLB03
HV-8471B	CCP-B SUCTION	OPEN	MLB02
LV-112C	VCT OUTLET ISOLATION	SHUT	MLB06
HV-8508A	CCP-A RV TO RWST ISOLATION	ENABLED	MLB09
HV-8508B	CCP-B RV TO RWST ISOLATION	ENABLED	MLB10
HV-8485A	CCP-A DISCHARGE ISOLATION	OPEN	MLB01
HV-8111A	CCP-A MINIFLOW	SHUT	MLB06
HV-8111B	CCP-B MINIFLOW	SHUT	MLB06
HV-8485B	CCP-B DISCHARGE ISOLATION	OPEN	MLB02
HV-8438	CCP DISCHARGE HEADER CROSSCONNECT	OPEN	MLB02
HV-8105	CHARGING TO RCS ISOLATION	SHUT	MLB06
HV-8801A	BIT DISCH ISOLATION	OPEN	MLB05
HV-8116	SAFETY GRADE CHARGING TO REGEN HX	SHUT	MLB01

Sheet 2 of 2

ATTACHMENT B (Cont'd)

VALVE LINEUP FOR CCP COLD LEG INJECTION THROUGH THE BIT

VALVE NUMBER	FUNCTION	POSITION	POSITION INDICATION
HV-8110	CCP-A&B COMMON MINIFLOW	SHUT	MLB05
HV-8801B	BIT DISCH ISOLATION	OPEN	MLB06
HV-8106	CHARGING TO RCS ISOLATION	SHUT	MLB05
HV-8924	SI PMP-A SUCTION XCONN TO CCP	OPEN	MLB01

END OF ATTACHMENT B

Sheet 1 of 1

ATTACHMENT C

VALVE LINEUP FOR SIP COLD LEG INJECTION

VALVE NUMBER	FUNCTION	POSITION	POSITION INDICATION
1204-U4-207	RWST SUPPLY TO ECCS	OPEN	LOCAL (RWST)
HV-8807A	SI PMP-A SUCTION XCONN TO CCP SUCTION HEADER	SHUT	MLB03
HV-8807B	SI PMP-A SUCTION XCONN TO CCP SUCTION HEADER	SHUT	MLB04
HV-8923A	SI PMP-A SUCT ISO VLV	OPEN	MLB01
HV-8806	RWST TO SI PUMPS	OPEN	MLB04
HV-8923B	SI PMP-B SUCT ISO VLV	OPEN	MLB02
HV-8814	SI PMP-A MINIFLOW ISO VLV	OPEN	MLB03
HV-8920	SI PMP-B MINIFLOW ISO VLV	OPEN	MLB03
HV-8821A	SI PMP-A TO COLD LEG ISO VLV	OPEN	MLB11
HV-8835	CL INJ FROM SIS	OPEN	MLB11
HV-8821B	SI PMP-B TO COLD LEG ISO VLV	OPEN	MLB12
HV-8813	SIS PMPS COMMON MINIFLOW ISO VLV	OPEN	MLB04
HV-8802A	SI PMP-A TO HOT LEG 1&4 ISO	SHUT	MLB11
HV-8802B	SI PMP-B TO HOT LEG 2&3 ISO	SHUT	MLB12

END OF ATTACHMENT C

Sheet 1 of 2

ATTACHMENT D

VALVE LINEUP FOR RHR PUMP COLD LEG INJECTION

VALVE NUMBER	FUNCTION	POSITION	POSITION INDICATION
1204-U4-207	RWST SUPPLY TO ECCS	OPEN	LOCAL (RWST)
HV-606	RHR HX TRAIN A OUTLET	OPEN	MLB01
HV-618	RHR HX TRAIN A BYPASS	SHUT	FIC-0618A
HV-607	RHR HX TRAIN B OUTLET	OPEN	MLB02
HV-619	RHR HX TRAIN B BYPASS	SHUT	FIC-0619A
HV-8804A	RHR PMP-A DISCH TO CHG PMPS SUCT	SHUT	MLB03
HV-8716B	RHR TRAIN B TO HOT LEG CROSSOVER ISO	OPEN	MLB04
HV-8811A	CNMT SUMP TO RHR PMP-A SUCTION	SHUT	MLB03
HV-8811B	CNMT SUMP TO RHR PMP-B SUCTION	SHUT	MLB04
HV-8812A	RWST TO RHR PMP-A SUCTION	OPEN	MLB03
HV-8701A	RHR PMP-A DOWNSTREAM SUCTION FROM HOT LEG LOOP 1	SHUT	HS-8701A
HV-8812B	RWST TO RHR PMP-B SUCTION	OPEN	MLB04
HV-8702A	RHR PMP-B DOWNSTREAM SUCTION FROM HOT LEG LOOP 4	SHUT	HS-8702A
HV-8701B	RHR PMP-A UPSTREAM SUCTION FROM HOT LEG LOOP 1	SHUT	HS-8701B
HV-8702B	RHR PMP-B UPSTREAM SUCTION FROM HOT LEG LOOP 4	SHUT	HS-8702B
HV-8809A	RHR PMP-A TO COLD LEG 1&2 ISO VLV	OPEN	MLB11

Sheet 2 of 2

ATTACHMENT D (Cont'd)

VALVE LINEUP FOR RHR PUMP COLD LEG INJECTION

VALVE NUMBER	FUNCTION	POSITION	POSITION INDICATION
HV-8716A	RHR TRAIN A TO HOT LEG CROSSOVER ISO	OPEN	MLB03
HV-8840	RHR TO HL ISO VLV	SHUT	MLB12
HV-8804B	RHR TO SI PMP-B ISO VLV	SHUT	MLB04
HV-8809B	RHR PMP-B TO COLD LEG 3&4 ISO VLV	OPEN	MLB12

END OF ATTACHMENT D

Sheet 1 of 2

ATTACHMENT E

POSSIBLE SOURCES OF ABNORMAL PRT CONDITIONS

RELIEF PATH TO PRT	INDICATION OF RELIEF PATH TO PRT	RELIEF PATH	COMPUTER POINT
PRZR PORV	• Abnormal high tailpipe temperature.	PV-455A PV-456A	- T6262
	• Valves not closed.	PV-455A HV-8000A	ZD8548 ZD8542
		PV-456A HV-8000B	ZD8546 ZD8544
PRZR SAFETY	• Abnormal high tailpipe temperature.	PSV-8010A PSV-8010B PSV-8010C	T6263 T6264 T6265
	• Valve not closed.	PSV-8010A PSV-8010B PSV-8010C	ZD9263 ZD9265 ZD9267
RCP NO. 1 SEAL LEAKOFF RELIEF	• Fluctuations in RCP no. 1 seal leakoff flow.	PSV-8121	-
	• Fluctuations in RCP no. 1 seal differential pressure.	PSV-8121	-
	• Excess letdown pressure greater than 150 psig with excess letdown aligned to VCT.	PSV-8121	-
REACTOR VESSEL HEAD VENT	• Indication of head vent flow with reactor head vent isolated from excess letdown.	HV-442A HV-442B	F9269 F9270
	• Reactor head vent to PRT throttle and isolation valves for a train - OPEN.	HV-8095A HV-8096A	ZD9298 ZD9302
		HV-442A	H0442
		HV-8095B HV-8096B	ZD9300 ZD9302
		HV-442B	H0443

Sheet 2 of 2

ATTACHMENT E (Cont'd)

POSSIBLE SOURCES OF ABNORMAL PRT CONDITIONS

RELIEF PATH TO PRT	INDICATION OF RELIEF PATH TO PRT	RELIEF PATH	COMPUTER POINT
LETDOWN LINE RELIEF	• Abnormal high temperature on TI-0125	PSV-8117	-
	• Letdown orifice isolation valves - OPEN.	PSV-8117	-
RHR PUMP SUCTION RELIEF	• RHR PUMP DISCHARGE HI PRESS annunciation.	PSV-8708A PSV-8708B	- -
	• RHR pump discharge pressure greater than 600 psig.	PSV-8708A PSV-8708B	- -
	• RCS pressure greater than 450 psig with RHR suction aligned to RCS hot legs.	PSV-8708A PSV-8708B	P0408 P0418 P0428 P0438

END OF ATTACHMENT E

FOLDOUT PAGE

1. RCP TRIP CRITERIA

   Trip all RCPs if BOTH conditions listed below occur:

   a. CCPs or SI pumps - AT LEAST ONE RUNNING.

   b. RCP Trip Parameter - RCS PRESSURE LESS THAN 1375 PSIG.

2. SI ACTUATION CRITERIA

   Actuate SI and return to Step 1 if EITHER conditions listed below occurs:

   - RCS subcooling - LESS THAN 24°F [38°F ADVERSE].

   - PRZR level - CANNOT BE MAINTAINED GREATER THAN 9% [36% ADVERSE].

3. RED PATH SUMMARY

   a. SUBCRITICALITY - Nuclear power greater than 5%.

   b. CORE COOLING - Core exit TCs greater than 1200°F.

      -OR-

      Core exit TCs greater than 711°F AND RVLIS full range less than 39% with no RCPs running.

   c. HEAT SINK - NR level in all SGs less than 10% [32% ADVERSE]

      AND total available feed flow less than 570 gpm.

   d. INTEGRITY - Cold leg temperature lowers more than 100°F in last 60 minutes AND WR RCS cold leg temperature less than 260°F.

   e. CONTAINMENT - Containment pressure greater than 52 psig.

4. AFW SUPPLY SWITCHOVER CRITERION
   Switch to alternate CST by initiating 13610, AUXILIARY FEEDWATER SYSTEM when CST level lowers to less than 15%.

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EMERGENCY OPERATING PROCEDURE

FR-H.1 RESPONSE TO LOSS OF SECONDARY HEAT SINK

PURPOSE

PRB REVIEW REQUIRED

This procedure provides actions to respond to a loss of secondary heat sink in all steam generators.

ENTRY CONDITIONS

- 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION, Step 18.
- 19200-C, F-0.3 HEAT SINK CSFST on a RED condition.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION:

- If total feed flow is less than 570 gpm due to operator action, and if total feed flow capability of 570 gpm is available, this FRP should not be performed.
- Feed flow should not be re-established to any faulted SG if a non-faulted SG is available.

NOTE: 91001-C, EMERGENCY CLASSIFICATION AND IMPLEMENTING PROCEDURE should be impletmented at this time.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. Check if secondary heat sink is required:	
a. RCS pressure - GREATER THAN ANY NON-FAULTED SG PRESSURE.	a. Go to 19010-C, E-1 LOSS OF REACTOR OR SECONDARY COOLANT.
b. RCS WR temperature - GREATER THAN 350°F.	b. Try to place the RHR system in service by initiating 13011, RESIDUAL HEAT REMOVAL SYSTEM. IF adequate cooling with the RHR system is established, THEN return to procedure and step in effect.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 2. Check if RCS bleed and feed is required:	
a. Check the following: • WR level in any 3 SGs-LESS THAN 29% [44% ADVERSE]. -OR- • RCS pressure due to loss of secondary heat sink - GREATER THAN 2335 PSIG.	a. WHEN either of the following exists: • WR level in any 3 SGs less than 29% [44% ADVERSE], -OR- • RCS pressure due to loss of secondary heat sink - GREATER THAN 2335 PSIG. THEN trip all RCPs and go to Step 11 and perform bleed and feed actions. Continue with Step 3
b. Trip all RCPs.	
c. Go to Step 11 and perform bleed and feed actions.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION: Switching to alternate CST by initiating 13610, AUXILIARY FEEDWATER SYSTEM will be necessary when CST level lowers to less than 15%.

NOTE:

- An intact steam generator should be used when available in attempting to establish a heat sink.
- IF an AFW pump is started prior to initiating bleed and feed, Step 3 should be repeated.
- If it is necessary to feed a hot (T_{hot} >550°F) steam generator(s) whose level is less than 9% WR (31% ADVERSE), it (they) should be fed one at a time at a flow rate of 30 gpm to 100 gpm until level is greater than 9% WR (31% ADVERSE), unless bleed and feed is imminent, in which case there is no limit on the flow rate.

* 3. Try to establish AFW flow to at least one SG:

a. Check control room indications for cause of AFW failures:

- CST level.
- AFW pump power supplies - AVAILABLE.
- AFW valves are aligned according to 13610, AUXILIARY FEEDWATER SYSTEM.

b. Try to restore AFW flow.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
(Step 3 continued from previous page)	
c. Check total flow to SG(s) - GREATER THAN 570 GPM.	c. Dispatch operator to restore AFW flow: • Open supply valves: TDAFW UNIT 1 HV-5122 (AB-A12) SG-1 FROM TDAFW HV-5125 (CB-A56) SG-2 FROM TDAFW HV-5127 (CB-A56) SG-3 FROM TDAFW HV-5120 (AB-A12) SG-4 FROM TDAFW UNIT 2 HV-5122 (AB-A105) SG-1 FROM TDAFW HV-5125 (CB-A09) SG-2 FROM TDAFW HV-5127 (CB-A09) SG-3 FROM TDAFW HV-5120 (AB-A105) SG-4 FROM TDAFW

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
(Step 3 continued from previous page)	
	MDAFW UNIT 1 HV-5139 (AB-A12) SG-1 FROM MDAFW PMP-A HV-5132 (CB-A56) SG-2 FROM MDAFW PMP-B HV-5134 (CB-A56) SG-3 FROM MDAFW PMP-B HV-5137 (AB-A12) SG-4 FROM MDAFW PMP-A UNIT 2 HV-5139 (AB-A105) SG-1 FROM MDAFW PMP-A HV-5132 (CB-A09) SG-2 FROM MDAFW PMP-B HV-5134 (CB-A09) SG-3 FROM MDAFW PMP-B HV-5137 (AB-A105) SG-4 FROM MDAFW PMP-A • Start TDAFW pump. Go to Step 4.
d. Return to procedure and step in effect.	
4. Stop all RCPs.	
5. Check CCP status - AT LEAST ONE AVAILABLE.	5. Go to Step 11.

ACTION/EXPECTED RESPONSE — RESPONSE NOT OBTAINED

CAUTION: If offsite power is lost after SI reset, action is required to restart the following ESF equipment if plant conditions require their operation:

- SI pumps
- RHR pumps
- Post-LOCA cavity purge units
- Containment Coolers in low speed (Started in high speed on a UV signal)
- ESF Chilled Water Pumps (if CRI has been reset)

NOTE:

- If BFIV(s) or BFRV(s) cannot be opened from the control room, an operator should be dispatched to locally open valve(s) as required.
- When the Reactor Trip Breakers are closed in Step 6g, they should immediately re-open due to continued presence of reactor trip signal(s).
- If feedwater flow greater than 570 gpm is established prior to intiating bleed and feed and subsequently any 3 steam generator's WR level falls to less than 29% (44% ADVERSE), then bleed and feed is not required.

* 6. Try to establish main FW to at least one SG:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
a. Check condensate system - IN SERVICE.	a. Place condensate system in service by initiating 13615, CONDENSATE AND FEEDWATER SYSTEM. IF the condensate system can NOT be placed in service, THEN go to Step 10.
b. Check if SG(s) feedwater isolation valves - OPEN. Go to Step 6h.	b. IF FW isolation has been actuated, THEN reset FW isolation.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
(Step 6 continued from previous page)	
c. Check if SI has been actuated.	c. Go to Step 6h.
d. Check the following plant conditions:	
1) Check CNMT pressure - LESS THAN 3.8 PSIG (HI-1).	1) Bypass the CNMT HI-1 pressure inputs in 2 of 3 NSSS protection channels (Channels 2, 3, 4, Bistables PB-936B, PB-935B, PB-934B) by initiating 13509-C, BYPASS TEST INSTRUMENTATION (BTI) PANEL OPERATION.
2) Check PRZR pressure - GREATER THAN 2000 PSIG.	2) Block SI signals: • Low steamline pressure SI • Low PRZR pressure SI Go to Step 6g.
3) Any steamline pressure - LESS THAN 585 PSIG.	3) Go to Step 6g.
e. Depressurize RCS to less than 1950 psig.	
1) Check letdown - in service.	1) Use one PRZR PORV. __IF__ PRZR PORVs are __NOT__ available, __THEN__ use auxiliary spray by initiating 13006, CHEMICAL AND VOLUME CONTROL SYSTEM. Go to Step 6f.
2) Use auxiliary spray by initiating 13006, CHEMICAL AND VOLUME CONTROL SYSTEM.	2) Use one PRZR PORV.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
(Step 6 continued from previous page)	
f. Block SI signals: • Lo steamline pressure SI • Lo PRZR pressure SI	f. WHEN RCS pressure is less than P-11 setpoint, THEN block SI signals. • Lo steamline pressure SI • Low PRZR pressure SI
g. Perform the following: 1) Reset SI. 2) Close RTBs. 3) Reset FW Isolation. 4) Energize stub busses.	
h. Verify the following: • MFRVs - SHUT AND IN MANUAL. • BFRVs - SHUT AND IN MANUAL.	

NOTE: MFP differential pressure should be maintained approximately 50 psid to minimize SG depressurization due to no RCPs running.

i. Ensure one MFP running by initiating 13615, CONDENSATE AND FEEDWATER SYSTEM.	i. Go to Step 8.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
(Step 6 continued from previous page)	
j. Verify BFIVs - OPEN.	j. Open MFIVs. • IF MFIVs will not open, THEN dispatch an operator to locally open the BFIVs: • SG-1 HV-15196 SOUTH MAIN FW ROOM • SG-2 HV-15197 NORTH MAIN FW ROOM • SG-3 HV-15198 NORTH MAIN FW ROOM • SG-4 HV-15199 SOUTH MAIN FW ROOM IF neither BFIVs or MFIVs will open, THEN go to Step 10.

NOTE: Feed rate should be controlled to minimize SG depressurization due to no RCPs running.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
k. Slowly open BFRVs to establish feed flow.	k. Open MFRVs. IF MFRVs will not open, THEN dispatch an operator to locally open the BFRVs: • SG-1 LV-5243 SOUTH MAIN FW ROOM • SG-2 LV-5244 NORTH MAIN FW ROOM • SG-3 LV-5245 NORTH MAIN FW ROOM • SG-4 LV-5242 SOUTH MAIN FW ROOM IF neither BFRVs or MFRVs will open, THEN go to Step 10.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 7. Check SG levels:	
a. NR level in at least one SG - GREATER THAN 10% [32% ADVERSE].	a. IF feed flow to at least one SG verified, THEN maintain flow to restore NR level to greater than 10% [32% ADVERSE]. IF feed flow to at least one SG can NOT be verified, THEN go to Step 8.
b. Return to procedure and step in effect.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION:

- Following block of automatic SI actuation, manual SI actuation may be required if PRZR level lowers to less than 9% [36% ADVERSE] or RCS subcooling lowers to less than 24°F [38°F ADVERSE].
- RCS pressure should be maintained less than 2000 psig following block of automatic SI actuation to prevent unblocking of low PRZR pressure and low steamline pressure SI signals.

NOTE:

- Steam generators being depressurized should be monitored for radiation to identify SG tube degradation.
- If condensate flow greater than 300,000 lbm/hr is established prior to intiating bleed and feed and any 3 steam generator WR levels subsequently fall to less than 29% (44% ADVERSE), then bleed and feed is not required.

8. Try to establish feed flow from the condensate systems to one SG:

   a. Depressurize RCS to less than 1950 psig.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1) Check letdown - IN SERVICE.	1) Use one PRZR PORV. IF PRZR PORVs are NOT available, THEN use auxiliary spray by initiating 13006, CHEMICAL AND VOLUME CONTROL SYSTEM. Go to Step 8b.
2) Use auxiliary spray by initiating 13006, CHEMICAL AND VOLUME CONTROL SYSTEM.	2) Use one PRZR PORV.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
(Step 8 continued from previous page)	
b. Block SI signals: • Low steamline pressure SI • Low PRZR pressure SI	
c. Shut all MSIVs and BSIVs except on selected SG.	
d. Depressurize the selected SG to less than 550 psig using steam dumps.	d. Actuate main steamline isolation. Dump steam using SG ARV(s). <u>IF NOT</u> able to dump steam, <u>THEN</u> go to Step 10.
e. Establish condensate flow to selected SG:	
1) Open main feed pump discharge valves.	1) <u>IF</u> discharge valves can <u>NOT</u> be opened, <u>THEN</u> locally open MFP bypass valve 1305-U4-655 (TB-Lvl 2)
2) Verify at least one condensate pump - RUNNING.	2) Start one condensate pump per 13615, CONDENSATE AND FEEDWATER SYSTEM.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
(Step 8 continued from previous page)	
3) Open BFIV on selected SG.	3) Open MFIVs. • IF MFIVs will not open, THEN dispatch an operator to locally open the BFIVs: • SG-1 HV-15196 SOUTH MAIN FW ROOM • SG-2 HV-15197 NORTH MAIN FW ROOM • SG-3 HV-15198 NORTH MAIN FW ROOM • SG-4 HV-15199 SOUTH MAIN FW ROOM • IF neither BFIVs or MFIVs will open, THEN go to Step 10.
4) Slowly open BFRV on selected SG to establish feed flow.	4) Open MFRVs. IF MFRVs will not open, THEN dispatch an operator to locally open the BFRVs: • SG-1 LV-5243 SOUTH MAIN FW ROOM • SG-2 LV-5244 NORTH MAIN FW ROOM • SG-3 LV-5245 NORTH MAIN FW ROOM • SG-4 LV-5242 SOUTH MAIN FW ROOM IF neither BFRVs or MFRVs will open, THEN go to Step 10.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. Check SG levels:	
a. NR level in at least one SG - GREATER THAN 10% [32% ADVERSE].	a. IF feed flow to at least one SG is verified, THEN maintain flow to restore NR level to greater than 10% [32% ADVERSE]. IF feed flow to at least one SG is NOT verified, THEN go to Step 10.
b. Check if RCS bleed and feed established per Steps 11 thru 14.	b. Return to procedure and step in effect.
c. Go to Step 21.	
10. Check for loss of secondary heat sink: • WR level in any 3 SGs is less than 29% [44% ADVERSE]. -OR- • RCS pressure due to loss of secondary heat sink-GREATER THAN 2335 PSIG	10. Return to Step 1.

CAUTION: Steps 11 thru 14 should be performed quickly in order to establish RCS heat removal by RCS bleed and feed.

11. Actuate SI.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12. Verify RCS feed path:	12. Start pumps and align valves as necessary to establish a feed path using ATTACHMENT A or B.
a. Verify ECCS pump status: • CCPs - AT LEAST ONE RUNNING. -OR- • SI pumps - AT LEAST ONE RUNNING.	IF a feed path can NOT be established, THEN continue attempts to establish feed flow. Return to Step 6.
b. Verify ECCS valve alignment - PROPER INJECTION LINEUP INDICATED ON MLBs.	

CAUTION: During bleed and feed operation the PRT may rupture. Containment pressure should be monitored and CS actuation should be verified if containment pressure reaches 21.5 psig.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13. Establish RCS bleed path:	
a. Place all PRZR heaters in OFF/PTL.	
b. Verify power to PRZR PORV block valves - AVAILABLE.	b. Restore power to block valves.
c. Arm COPS and verify PRZR PORV block valves - BOTH OPEN.	c. Open both PRZR PORV block valves.
d. Open both PRZR PORVs.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION: The PRT may rupture while performing safety grade letdown.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14. Verify adequate RCS bleed path: • PRZR PORVs - BOTH OPEN. • PRZR PORV block valves - BOTH OPEN. • COPS - ARMED.	14. Perform the following: a. Open reactor vessel head vent valves: • HV-8095A - RX HEAD VENT TO LETDOWN ISOLATION VLV • HV-8095B - RX HEAD VENT TO LETDOWN ISOLATION VLV • HV-8096A - RX HEAD VENT TO LETDOWN ISOLATION VLV • HV-8096B RX HEAD VENT TO LETDOWN ISOLATION VLV • HV-0442A - REACTOR HEAD VENT TO PRT • HV-0442B - REACTOR HEAD VENT TO PRT

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
(Step 14 continued from previous page)	
	b. Align any available low pressure water source to at least one intact SG: • Alternate CST to AFW • Demineralized water to CSTs • Fire protection water to CST truck fill line using adaptor located in FHH 588 or 602. • Fire protection water to AFW test header line 1302-002-3" flanged connection using adapter and tools stored in Control Room emergency equipment area. Lines are located in CB-RA57 (RA08) North MFRV area SE corner (U1) and SW corner (U2). IF no low-pressure water source can be aligned, THEN go to Step 15.
	c. Depressurize at least one intact SG to atmospheric pressure using SG ARV to allow low pressure water source to feed the SG.
15. Perform Steps 1 thru 16 of 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION while continuing with this procedure.	
*16. Maintain RCS heat removal: • Maintain ECCS flow. • Maintain PRZR PORVs - BOTH OPEN.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION: If offsite power is lost after SI reset, action is required to restart the following ESF equipment if plant conditions require their operation:

- SI pumps
- RHR pumps
- Post-LOCA cavity purge units.
- Containment Coolers in low speed (Started in high speed on a UV signal)
- ESF Chilled Water Pumps (if CRI has been reset)

17. Reset SI.

CAUTION: Repositioning Phase A isolation valves may cause radiation problems throughout the plant.

18. Reset containment isolation Phase A.

19. Establish instrument air to containment:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
a. Verify instrument air pressure - GREATER THAN 100 PSIG.	a. Start additional air compressors to establish instrument air pressure greater than 100 psig by initiating 13710, SERVICE AIR SYSTEM.
b. Open INSTR AIR CNMT ISO VLV HV-9378 using handswitches HS-9378A and HS-9378B.	

ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

CAUTION:
- If RWST level lowers to less than 39%, ECCS should be aligned for cold leg recirculation using 19013-C, ES-1.3 TRANSFER TO COLD LEG RECIRCULATION.
- RHR pumps should not be run longer than 30 minutes without CCW to the RHR heat exchangers.

NOTE:
- Continued attempts to establish a secondary heat sink should use Steps 3, 6 and 8 as guidance.
- If bleed and feed has been initiated and RCS Core Exit temperatures are stable or lowering, feed flow to one steam generator at a time should be established at a rate of 30-100 gpm until level exceeds 9% WR [31% ADVERSE].

*20. Continue attempts to establish secondary heat sink in at least one SG:

- AFW flow.
- Main FW flow.
- Condensate flow.

21. Check for adequate secondary heat sink:

a. NR level in at least one SG - GREATER THAN 10% [32% ADVERSE].

RESPONSE NOT OBTAINED: a. Return to Step 20.

22. Check RCS temperatures:

- Core exit TCs - LOWERING.
- RCS WR hot leg temperatures - LOWERING.

RESPONSE NOT OBTAINED: 22. Return to Step 20.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
23. Verify reactor head vent valves - SHUT: • HV-8095A - RX HEAD VENT TO LETDOWN ISOLATION VLV • HV-8095B - RX HEAD VENT TO LETDOWN ISOLATION VLV • HV-8096A - RX HEAD VENT TO LETDOWN ISOLATION VLV • HV-8096B - RX HEAD VENT TO LETDOWN ISOLATION VLV • HV-0442A - REACTOR HEAD VENT TO PRT • HV-0442B - REACTOR HEAD VENT TO PRT	23. Shut valves.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE:

- After stopping any ECCS pump, RCS pressure should be allowed to stabilize or rise before stopping another ECCS pump.
- The CCPs and SI pumps should be stopped on alternate EDDS trains when possible.

24. Check if one CCP should be stopped.

a. Check two CCPs - RUNNING. — a. Go to Step 25.

b. Determine required RCS subcooling from the table:

	SUBCOOLING CRITERIA (°F)	
SI PUMP STATUS	NORMAL	ADVERSE
NONE RUNNING	95	108
ONE RUNNING	53	67
TWO RUNNING	49	63

c. Check RCS subcooling - GREATER THAN REQUIRED SUBCOOLING.

c. IF RCS WR hot leg temperature greater than 350°F [340°F ADVERSE], THEN go to Step 27.

IF RCS WR hot leg temperature less than 350°F [340°F ADVERSE], THEN perform the following:

1) Ensure at least one RHR pump running.

2) IF RHR pump running, THEN go to Step 24d.

3) IF RHR pumps can NOT be operated, THEN go to Step 27.

d. Check PRZR level - GREATER THAN 9% [36%ADVERSE].

d. Do NOT stop CCP. Go to Step 27.

e. Stop one CCP.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

25. Check if one SI pump should be stopped:

a. Check SI pump - ANY RUNNING.

a. Go to Step 26.

b. Determing the required RCS subcooling from the table:

SI PUMP STATUS	SUBCOOLING CRITERIA (°F)			
	ONE CHARGING PUMP		NO CHARGING PUMPS	
	NORMAL	ADVERSE	NORMAL	ADVERSE
ONE RUNNING	153	167	DO NOT STOP SIP	DO NOT STOP SIP
TWO RUNNING	43	57	59	73

c. Chec RCS subcooling - GREATER THAN REQUIRED SUBCOOLING.

c. IF RCS WR hot leg temperature greater than 350°F [340°F ADVERSE], THEN go to Step 27.

IF RCS WR hot leg temperature less than 350°F [340°F ADVERSE], THEN perform the following:

1) Ensure at least one RHR pump running.

2) IF RHR pump running, THEN go to Step 25d.

3) IF RHR pumps can NOT be operated, THEN go to Step 27.

d. Check PRZR level - GREATER THAN 9% [36% ADVERSE].

e. Stop one additional SI pump.

f. Return to Step 25a.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
26. Check if normal charging should be established:	
a. Check the following: • SI Pumps - STOPPED • CCPs - ALL BUT ONE STOPPED.	a. Do NOT isolate BIT. Return to Step 24.
b. Check RCS subcooling - GREATER THAN 35°F [48°F ADVERSE].	b. Do NOT isolate BIT. Go to Step 27.
c. Check PRZR level - GREATER THAN 9% [36% ADVERSE].	c. Do NOT isolate BIT. Go to Step 27.
d. Go to Step 28.	

NOTE: After shutting a PRZR PORV, it may be necessary to wait for RCS pressure to rise to permit stopping ECCS pumps in Steps 24 and 25.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
27. Check RCS bleed path:	
a. PRZR PORVs and associated block valves - ANY OPEN	a. Go to 19010-C, E-1 LOSS OF REACTOR OR SECONDARY COOLANT.
b. Shut one PRZR PORV.	b. Shut PRZR PORV block valve. IF block valve can NOT be shut, THEN go to 19010-C, E-1 LOSS OF REACTOR OR SECONDARY COOLANT.
c. Return to Step 22.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE: Without instrument air available, charging should be established using ATTACHMENT C.

28. Establish charging flow:

    a. Open CCP normal miniflow isolation valves:

    - HV-8111A - CCP-A MINIFLOW
    - HV-8111B - CCP-B MINIFLOW
    - HV-8110 - CCP A&B COMMON MINIFLOW

    Response not obtained: a. Go to Step 28c.

    b. Shut CCP alternate miniflow valves and verify white light extinguishes:

    - HV-8508A - CCP-A RV TO RWST ISOLATION
    - HV-8508B - CCP-B RV TO RWST ISOLATION

    c. Set SEAL FLOW CONTROL HC-0182 to maximum seal flow (HV-0182 - SHUT).

    d. Open CHARGING TO RCS ISOLATION valves:

    - HV-8105
    - HV-8106

    e. Shut BIT DISCH ISOLATION valves:

    - HV-8801A
    - HV-8801B

    f. Maintain RCP seal flow - 8 TO 13 GPM PER RCP.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*29. Check if PRZR PORVs should be shut:	
a. PRZR pressure - LESS THAN 2315 PSIG.	a. Verify at least one PRZR PORV and associated block valve open. WHEN pressure less than 2315 psig, THEN perform Step 29b. Go to Step 30.
b. PRZR PORVs - ALL SHUT.	b. Shut PORV. IF any PORV can NOT be shut, THEN shut its block valve.
*30. Check if RHR pumps should be stopped:	
a. Check RCS pressure: 1) Pressure - GREATER THAN 300 PSIG. 2) Pressure - STABLE OR RISING.	a. Go to 19010-C, E-1 LOSS OF REACTOR OR SECONDARY COOLANT.
b. Stop RHR pumps.	
*31. Control charging flow to maintain PRZR level.	
32. Go to 19011-C, ES-1.1 SI TERMINATION, Step 10.	

END OF PROCEDURE TEXT

Sheet 1 of 2

ATTACHMENT A

VALVE LINEUP FOR CCP COLD LEG INJECTION THROUGH THE BIT

VALVE NUMBER	FUNCTION	POSITION	POSITION INDICATION
1204-U4-207	RWST SUPPLY TO ECCS	OPEN	LOCAL (RWST)
LV-112D	RWST TO CCP A&B SUCTION	OPEN	MLB09
LV-112E	RWST TO CCP A&B SUCTION	OPEN	MLB10
LV-112B	VCT OUTLET ISOLATION	SHUT	MLB05
HV-8471A	CCP-A SUCTION	OPEN	MLB01
HV-8509B	CCP-A RV TO RWST ISOLATION	OPEN	MLB04
HV-8509A	CCP-B RV TO RWST ISOLATION	OPEN	MLB03
HV-8471B	CCP-B SUCTION	OPEN	MLB02
LV-112C	VCT OUTLET ISOLATION	SHUT	MLB06
HV-8508A	CCP-A RV TO RWST ISOLATION	ENABLE PTL	MLB09
HV-8508B	CCP-B RV TO RWST ISOLATION	ENABLE PTL	MLB10
HV-8485A	CCP-A DISCHARGE ISOLATION	OPEN	MLB01
HV-8111A	CCP-A MINIFLOW	SHUT	MLB06
HV-8111B	CCP-B MINIFLOW	SHUT	MLB06
HV-8485B	CCP-B DISCHARGE ISOLATION	OPEN	MLB02
HV-8438	CCP DISCHARGE HEADER CROSSCONNECT	OPEN	MLB02
HV-8105	CHARGING TO RCS ISOLATION	SHUT	MLB06

Sheet 2 of 2

ATTACHMENT A

VALVE LINEUP FOR CCP COLD LEG INJECTION THROUGH THE BIT

VALVE NUMBER	FUNCTION	POSITION	POSITION INDICATION
HV-8801A	BIT DISCH ISOLATION	OPEN	MLB05
HV-8116	SAFETY GRADE CHARGING TO REGEN HX	SHUT	MLB01
HV-8110	CCP-A&B COMMON MINIFLOW	SHUT	MLB05
HV-8801B	BIT DISCH ISOLATION	OPEN	MLB06
HV-8106	CHARGING TO RCS ISOLATION	SHUT	MLB05
HV-8924	SI PMP-A SUCTION XCONN TO CCP	OPEN	MLB01

END OF ATTACHMENT A

Sheet 1 of 1

ATTACHMENT B

VALVE LINEUP FOR SI PUMP COLD LEG INJECTION

VALVE NUMBER	FUNCTION	POSITION	POSITION INDICATION
1204-U4-207	RWST SUPPLY TO ECCS	OPEN	LOCAL (RWST)
HV-8807A	SI PMP-A SUCTION XCONN TO CCP SUCTION HEADER	SHUT	MLB03
HV-8807B	SI PMP-A SUCTION XCONN TO CCP SUCTION HEADER	SHUT	MLB04
HV-8923A	SI PMP-A SUCT ISO VLV	OPEN	MLB01
HV-8806	RWST TO SI PUMPS	OPEN	MLB04
HV-8923B	SI PMP-B SUCT ISO VLV	OPEN	MLB02
HV-8814	SI PMP-A MINIFLOW ISO VLV	OPEN	MLB03
HV-8920	SI PMP-B MINIFLOW ISO VLV	OPEN	MLB03
HV-8821A	SI PMP-A TO COLD LEG ISO VLV	OPEN	MLB11
HV-8835	CL INJ FROM SIS	OPEN	MLB11
HV-8821B	SI PMP-B TO COLD LEG ISO VLV	OPEN	MLB12
HV-8813	SIS PMPS COMMON MINIFLOW ISO VLV	OPEN	MLB04
HV-8802A	SI PMP-A TO HOT LEG 1&4 ISO VLV	SHUT	MLB11
HV-8802B	SI PMP-B TO HOT LEG 2&3 ISO VLV	SHUT	MLB12

END OF ATTACHMENT B

ATTACHMENT C

ESTABLISHING CHARGING WITHOUT INSTRUMENT AIR

A. Establish Charging With Train A Emergency Bus Energized:

1. Verify at least one RWST TO CCP SUCTION - OPEN:
   - LV-0112D
   - LV-0112E
2. Verify at least one VCT OUTLET ISOLATION - SHUT:
   - LV-0112B
   - LV-0112C
3. Verify CCP-A RV TO RWST ISOLATION:
   - HV-8508A - ENABLE PTL
   - HV-8509B - OPEN
4. Verify - SHUT:
   - HV-8110 CCP A&B COMMON MINIFLOW
5. Ensure Train A charging isolation valves - OPEN:
   - HV-8116 SAFETY GRADE CHARGING TO REGEN HX
   - HV-0190A CCP-A SAFETY GRADE CHG
   - HV-8105 CHARGING TO RCS ISOLATION (locally verify if Train B emergency bus de-energized)

   UNIT 1 AB-A09
   UNIT 2 AB-A103

*6. Dispatch operators to maintain 8 to 13 gpm seal injection flow by throttling OPEN:

UNIT 1	UNIT 2
1-1208-U6-152 (AB-C114)	2-1208-U6-152 (AB-C10)

ATTACHMENT C

ESTABLISHING CHARGING WITHOUT INSTRUMENT AIR

7. Stop CCP-A, if running.

8. Shut HV-8485A CCP-A DISCHARGE ISOLATION.

9. Start CCP-A.

10. Shut the following charging isolation valves:

    - HV-8106 CHARGING TO RCS ISOLATION
    - HV-8801A BIT DISCHARGE ISOLATION
    - HV-8801B BIT DISCHARGE ISOLATION
      (DISPATCH OPERATOR IF REQUIRED)

*11. Maintain desired charging flow as shown on FI-0138A using HV-0190A CCP-A SAFETY GRADE CHG.

ATTACHMENT C

ESTABLISHING CHARGING WITHOUT INSTRUMENT AIR

B. Establish Charging With Train B Emergency Bus Energized:

1. Verify at least one RWST TO CCP SUCTION - OPEN:
   - LV-0112D
   - LV-0112E
2. Verify at least one VCT OUTLET ISOLATION - SHUT:
   - LV-0112B
   - LV-0112C
3. Verify CCP-B RV TO RWST ISOLATION:
   - HV-8508B - ENABLE PTL
   - HV-8509A - OPEN
4. Verify - SHUT:
   - HV-8111A CCP A MINIFLOW
   - HV-8111B CCP-B MINIFLOW
5. Ensure Train B charging isolation valve HV-0190B CCP-B SAFETY GRADE CHG - OPEN:
6. Verify Train B BIT outlet isolation valve HV-8801B BIT DISCH ISOLATION - OPEN.

*7. Dispatch operators to maintain 8 to 13 gpm seal injection flow by throttling OPEN:

UNIT 1	UNIT 2
1-1208-U6-151 (AB-C119)	2-1208-U6-151 (AB-C19)

Sheet 4 of 4

ATTACHMENT C

ESTABLISHING CHARGING WITHOUT INSTRUMENT AIR

8. Stop CCP-B, if running.

9. Shut HV-8485B CCP-B DISCHARGE ISOLATION.

10. Start CCP-B.

11. Shut the following charging isolation valves:

- HV-8105 CHARGING TO RCS ISOLATION
- Dispatch operator to shut CVCS CHG PMPS DISCH FV-0121 OUT ISO:

UNIT 1	UNIT 2
1-1208-U6-153 (AB-C112)	2-1208-U6-153 (AB-C09)

* 12. Maintain desired charging flow as shown on FI-0917A using HV-0190B CCP-B SAFETY GRADE CHG.

END OF ATTACHMENT C

Facility: __VOTGLE____________ Scenario No.: ___2_____ Op-Test No.: ________

Examiners: _R. BALDWIN _________ Operators: ______________________
_B. Holbrook___________________ ______________________
_M. Sykes_____________________ ______________________

Objectives: The crew members should respond to failures in accordance with plant procedures and guidelines.

Initial Conditions: IC 14 (reduce to 90% Reactor Power), #4 SG ARV OOS with red tag (INFO LCO), ~9 GPD tube leak on # 2 S/G (SG-01B @ 0.001%), PDP in service., override BIT discharge valve 1-HV-8801B Shut. Switch aux steam to U2 and swap to aux steam per 18009 section B.

Turnover: Reactor: **Maintain 100 % power**. Motor Driven AFW "A" is OOS for bearing replacement 16 hours into the 72 hour action statement. Repair to be completed in 4 hours. , #4 SG ARV OOS (INFO LCO), ~9 GPD tube leak on # 2 S/G (18006-C section B in progress), tornado warning for burke county, procedure 11889-C has been completed. # 4 steam line radiation monitor OOS.

Standing order to monitor RCP #1 vibrations hourly. RCP should be shutdown within 4 hours if shaft vibration exceeds 15 mils

Event No.	Malf. No.	Event Type*	Event Description
1	CV07	C/N/ RO/ SRO	Loss of operating charging pump, (PDP pump), Procedure 18007-C, Section B Loss of Charging Flow. Requires letdown to be isolated and therefore subsequently to be returned to service. This will be a normal for the RO candidate. In addition this requires startup of a standby charging pump by the RO. This will leave 2 CCPs for operation.
2	CV12	I/RO/ SRO	VCT level Transmitter LT 185 Fails High. No audible alarm , but actual VCT level will decrease at the rate of letdown flow. No specific procedure direction. This will test system knowledge & diagnostic skills. Long term success path is placing LV112A in the VCT position

Facility: __VOTGLE___________	Scenario No.: ___2_____	Op-Test No.: _______	

Examiners: _R. BALDWIN _________
_B. Holbrook__________________
_M. Sykes____________________

Operators: ________________

Objectives: The crew members should respond to failures in accordance with plant procedures and guidelines.

Initial Conditions: IC 14 (reduce to 90% Reactor Power), #4 SG ARV OOS with red tag (INFO LCO), ~9 GPD tube leak on # 2 S/G (SG-01B @ 0.001%), PDP in service., override BIT discharge valve 1-HV-8801B Shut. Switch aux steam to U2 and swap to aux steam per 18009 section B.

Turnover: Reactor: **Maintain 100 % power**. Motor Driven AFW "A" is OOS for bearing replacement 16 hours into the 72 hour action statement. Repair to be completed in 4 hours. , #4 SG ARV OOS (INFO LCO), ~9 GPD tube leak on # 2 S/G (18006-C section B in progress), tornado warning for burke county, procedure 11889-C has been completed. # 4 steam line radiation monitor OOS.

Standing order to monitor RCP #1 vibrations hourly. RCP should be shutdown within 4 hours if shaft vibration exceeds 15 mils

3	Override ALB170 08E04 To ON	C/R/RO/SRO	High shaft Vibration alert for RCP # 1. This will cause the crew to have to decrease power. RCP procedure 13003-1, RCP Operation states that the RCP should be shutdown when shaft vibration is 20 mils or greater and the frame vibration is 5 mils or greater. The malfunction should not go that high. This would allow the operators to decrease power to get credit for a reactivity manipulation. Local panel indicates 16 mils shaft vibration and steady on RCP #1. Frame vibs are all ~2 mils for all RCPs. Shafts of other RCPs are about 5 to 7 mils Prompt to ramp power down if consult OPS management
4	Override ALB170 63A05 ON	M	During the power decrease the plant will get a loose parts monitor alarm 17063-1, A05. Metal Impact MON SYS PNL Alarm will come in. This will require the crew to enter procedure 18039-C, Confirmed Loose Part in the RCS or Steam Generator Secondary Side. This will represent the RCP pump breaking and making its way to the Steam Generator. The crew should implement 18039-C. This may cause the crew to use the Rapid Power Reduction procedure, 18013-C. This will cause a tube leak in the # 1S/G. Corresponding to the

Facility: __VOTGLE___________ Scenario No.: ___2_____ Op-Test No.: _______

Examiners: _R. BALDWIN _________ Operators: ______________________
_B. Holbrook__________________ ______________________
_M. Sykes____________________ ______________________

Objectives: The crew members should respond to failures in accordance with plant procedures and guidelines.

Initial Conditions: IC 14 (reduce to 90% Reactor Power), #4 SG ARV OOS with red tag (INFO LCO), ~9 GPD tube leak on # 2 S/G (SG-01B @ 0.001%), PDP in service., override BIT discharge valve 1-HV-8801B Shut. Switch aux steam to U2 and swap to aux steam per 18009 section B.

Turnover: Reactor: **Maintain 100 % power**. Motor Driven AFW "A" is OOS for bearing replacement 16 hours into the 72 hour action statement. Repair to be completed in 4 hours. , #4 SG ARV OOS (INFO LCO), ~9 GPD tube leak on # 2 S/G (18006-C section B in progress), tornado warning for burke county, procedure 11889-C has been completed. # 4 steam line radiation monitor OOS.

Standing order to monitor RCP #1 vibrations hourly. RCP should be shutdown within 4 hours if shaft vibration exceeds 15 mils

	SG-01A Ramp to 25% over 10 minutes		# 1 RCP problem. The crew would also initiate 18009-C, SG Tube leak. (Large) Ultimately, the tube leak will escalate until there is a tube rupture. Prompts: 1. Duty manager from engineering that tape analysis confirms loose part on primary of SG#1 2. Multiple sustained impacts in SG#1 channel head (eng) 3. Implement 18013-C rapid down power AOP
	Override on a trigg er set to react or trip		Have the SG ARV on the # 1 Steam Generator triggered to stick open on the reactor trip by use of the controller up override. Manual control from the control room is not available. However, .local isolation will isolate the ARV. May have to go to 19020-C, FAULTED STEAM GENERATOR ISOLATION. Depending on the crew's actions and the time it takes them to get a person out to the ARV for manual operations.

Facility: __VOTGLE___________ Scenario No.: ___2_____ Op-Test No.: _______

Examiners: _R. BALDWIN _________ Operators: ________________________
_B. Holbrook__________________ ________________________
_M. Sykes____________________ ________________________

Objectives: The crew members should respond to failures in accordance with plant procedures and guidelines.

Initial Conditions: IC 14 (reduce to 90% Reactor Power), #4 SG ARV OOS with red tag (INFO LCO), ~9 GPD tube leak on # 2 S/G (SG-01B @ 0.001%), PDP in service., override BIT discharge valve 1-HV-8801B Shut. Switch aux steam to U2 and swap to aux steam per 18009 section B.

Turnover: Reactor: **Maintain 100 % power**. Motor Driven AFW "A" is OOS for bearing replacement 16 hours into the 72 hour action statement. Repair to be completed in 4 hours. , #4 SG ARV OOS (INFO LCO), ~9 GPD tube leak on # 2 S/G (18006-C section B in progress), tornado warning for burke county, procedure 11889-C has been completed. # 4 steam line radiation monitor OOS.

Standing order to monitor RCP #1 vibrations hourly. RCP should be shutdown within 4 hours if shaft vibration exceeds 15 mils

	Override HV8 801A shut ES08 ES16. And 17		Automatic actuation of SI will not occur. The operators will have to manually actuate SI via the main control board switches. Bit valve 8801A will not automatically nor will it manually reposition. One flow path through the BIT will not function. Only the A train will work on the Manual SI. Will have to Manually lineup the B train. The cross connect will have flow through the 8801A valve.

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

Op-Test No.: _____ Scenario No.: 2_____ Event No.: __1___

Event Description: Loss of operating charging pump, (PDP pump), Procedure 18007-C, Section B Loss of Charging Flow.

Requires letdown to be isolated and therefore subsequently to be returned to service. This will be a normal for the RO candidate. In addition this requires startup of a standby charging pump by the RO.

This will leave 2 CCPs for operation.

Time	Position	Applicant's Actions or Behavior
	RO	Observes the following annunciators: ALB-08 F-6, RCP SEAL WATER INJ LO FLOW, p 41 ALB-07 B-6, CHARGING LINE HI/LO FLOW, p 14 A-5, REGEN HX LTDN HI TEMP p 13 ALB-032 F-5, 480 V SWGR INB21 TROUBLE, p 68
		AOP 18007-C Section B Check Charging and Letdown. B.1 Check one or more pumps RUNNING. RNO Isolate Letdown B.2 Start standby CCP, using 13006 CVCS
		13006 Shifting from the PDP to A CCP

Op-Test No.: _____ Scenario No.: 2_____ Event No.: __1___

Event Description: Loss of operating charging pump, (PDP pump), Procedure 18007-C, Section B Loss of Charging Flow.

Requires letdown to be isolated and therefore subsequently to be returned to service. This will be a normal for the RO candidate. In addition this requires startup of a standby charging pump by the RO.

This will leave 2 CCPs for operation.

		4.2.2 Shifting From The PDP To A CCP 4.2.2.1 SELECT a CCP to be started. 4.2.2.2 ENSURE NSCW System flow through the motor and lubricating oil coolers of the CCP selected for starting 4.2.2.3 ALIGN the selected CCP for starting: a. OPEN 1-HV-8471A(1-HV-8471B) CCP-A(B) SUCTION. b. OPEN 1-HV-8111A(1-HV-8111B) CCP-A(B) MINIFLOW, and OPEN 1-HV-8110 CCP COMMON MINIFLOW. c. CLOSE 1-HV-0190A(1-HV-0190B) CHARGING THROTTLE. d. OPEN 1-HV-8485A(1-HV-8485B) CCP-A(B) DISCHARGE ISOLATION. e. If starting CCP-B, OPEN 1-HV-8438 CCP DISCHARGE HEADER CROSS-4.2.2.4 VERIFY the ALOP of the idle CCP(s) RUNNING as indicated by the QMCB red indicating lights ON. 4.2.2.4 VERIFY the ALOP of the idle CCP(s) RUNNING as indicated by the QMCB red indicating lights ON. 4.2.2.5 ENSURE 1-FIC-0121 CHARGING LINE in MAN and SET to minimum. 4.2.2.6 START the selected CCP by placing 4.2.2.7 VERIFY the selected Charging Pump ALOP red indicating light goes off (on QMCB) shortly after the pump is started. 4.2.2.8 ENSURE 1-SIC-0459A PD CHG PUMP SPEED maintains desired CHARGING LINE 1-FI-0121A flow.
		4.2.2.9 If required, ADJUST 1-HC-0182 SEAL FLOW CONTROL to maintain REACTOR COOLANT PUMP 1, 2, 3, 4 SEAL WATER 1-FI-0145A, 1-FI-0144A, 1-FI-0143A, and 1-FI-0142A between 8 and 13 gpm.

Op-Test No.: _____ Scenario No.: 2_____ Event No.: __1___

Event Description: Loss of operating charging pump, (PDP pump), Procedure 18007-C, Section B Loss of Charging Flow.

Requires letdown to be isolated and therefore subsequently to be returned to service. This will be a normal for the RO candidate. In addition this requires startup of a standby charging pump by the RO.

This will leave 2 CCPs for operation.

		4.2.2.10 ENSURE 1-SIC-0459A in MAN. 4.2.2.11 MAINTAIN Charging Line Flow constant on 1-FI-0121A while simultaneously performing the following: a. RAISE 1-FIC-0121 CHARGING LINE output, 4.2.2.12 When 1-SIC-0459A output is at minimum, STOP the PDP by placing 1-HS-0275 to STOP. b. LOWER 1-SIC-0459A output. AT this point should transfer to section 4.4.2
		4.4.2 Returning Normal Charging And Letdown To Service 4.4.2.1 ENSURE the following: a. CLOSE 1-HV-8149A, 1-HV-8149B, and 1-HV-8149C LETDOWN ORIFICE 45 & 75 gpm, b. CLOSE 1-LV-0460 AND 1-LV-0459 LETDOWN ISOLATION VLV UPSTREAM and DOWNSTREAM, c. CLOSE 1-HV-8145 PZR AUX SPRAY VALVE, d. OPEN 1-HV-15214 CVCS LETDOWN PIPE BREAK PROT ISOLATION, e. OPEN 1-HV-8160 RCS LETDOWN LINE ISO VLV IRC, f. OPEN 1-HV-8152 RCS LETDOWN LINE ISO VLV ORC, g. 1-PIC-0131 LETDOWN PRESS in MANUAL and output adjusted to 50% to 75%, h. 1-TIC-0130 LETDOWN HX OUTLET TEMP in MANUAL and output adjusted to 50%, i. 1-LR-0459 PRESSURIZER LEVEL greater than 17%,

Op-Test No.: _____ Scenario No.: 2_____ Event No.: __1___		
Event Description: Loss of operating charging pump, (PDP pump), Procedure 18007-C, Section B Loss of Charging Flow. Requires letdown to be isolated and therefore subsequently to be returned to service. This will be a normal for the RO candidate. In addition this requires startup of a standby charging pump by the RO. This will leave 2 CCPs for operation.		
		j. OPEN 1-HV-8146 NORMAL CHARGING TO LOOP 1 (even-numbered fuel cycle), or k. OPEN 1-HV-8147 ALTERNATE CHARGING TO LOOP 4 (odd-numbered fuel cycle). 4.4.2.2 OPEN 1-HV-8106 and 1-HV-8105 CHARGING TO RCS ISOLATIONs. 4.4.2.3 Simultaneously PERFORM the following: a. ADJUST 1-HC-0182 output to obtain between 8 and 13 gpm flow on RCP 1, 2, 3, and 4 SEAL INJECTION FLOWs 1-FI-0145A, 1-FI-0144A, 1-FI-0143A, and 1-FI-0142A, b. RAISE 1-FI-0121A CHG FLOW to between 80 and 90 gpm: (1) If a CCP is running, RAISE 1-FIC-0121 CHARGING LINE CONTROL output, (2) If the PDP is running, RAISE PD CHG PUMP SPEED 1-SIC-0459A output. 4.4.2.4 OPEN 1-LV-0460 and 1-LV-0459 LETDOWN ISOLATION VLV UPSTREAM AND DOWNSTREAM by holding 1-HS-0460 and 1-HS-0459 in OPEN until the valves are fully OPEN. 4.4.2.5 ESTABLISH Letdown flow by <u>simultaneously</u> performing the following: a. HOLD in the OPEN position until fully OPEN one Letdown Orifice: (1) 1-HS-8149A (45 gpm) or (2) 1-HS-8149B or 1-HS-8149C (75 gpm). b. MAINTAIN 1-PIC-0131A LETDOWN PRESS between 360 and 380 psig.

Op-Test No.: _____ Scenario No.: 2_____ Event No.: __1___

Event Description: Loss of operating charging pump, (PDP pump), Procedure 18007-C, Section B Loss of Charging Flow.

Requires letdown to be isolated and therefore subsequently to be returned to service. This will be a normal for the RO candidate. In addition this requires startup of a standby charging pump by the RO.

This will leave 2 CCPs for operation.

		4.4.2.6 When 1-PI-0131A LETDOWN PRESS stabilizes between 360 and 380 psig, PLACE 1-PIC-0131 in AUTO. 4.4.2.7 PLACE 1-TIC-0130 LETDOWN HX OUTLET TEMP in AUTO and ENSURE it maintains temperature less than or equal to 115°F. 4.4.2.8 ENSURE 1-TI-0127 REGEN HEAT EXCH LETDWN indicates less than 380°F. 4.4.2.9 MONITOR 1-LR-0459 pressurizer level and pressurizer level setpoint. 4.4.2.10 MAINTAIN pressurizer level within 1% of setpoint using 1-SIC-0459A or 1-FIC-0121 output as applicable. 4.4.2.11 If desired, PLACE pressurizer level control in automatic: a. ENSURE 1-LIC-0459 PRZR LEVEL CONT in AUTO, b. PLACE 1-FIC-0121 or 1-SIC-0459A in AUTO.
	SRO	Direct the RO to place the B CCP in service IAW SOP-13006.
		Once Charging has been placed in service Direct RO to place Letdown back in service in accordance with SOP-13006
		Call Maintenance to check out the PDP
		Send a PEO to check out the pump breaker
		Review Technical Requirements Manual 13.1.3 and 13.1.5

Op-Test No.: _____ Scenario No.: _2____ Event No.: __2___

Event Description: VCT level Transmitter LT 185 Fails **HIGH**.

No audible alarm , but actual VCT level will decrease at the rate of letdown flow.

No specific procedure direction. This will test system knowledge & diagnostic skills. Long term success path is placing LV112A in the VCT position

Time	Position	Applicant's Actions or Behavior
	RO/SRO	Observes the following indications: LT-185 Indicates high Divert on 1LV112A amber light lit.
		Diagnosis LT-185 failure and initiates procedure 17007-1 for alarm E-05.
		2 Methods to accomplish this: A. Go to hard VCT on the Divert valve. B. Run down the controller on 1 LIC-185 close valve and leave the divert in the AUTO position.

Op-Test No.: _____ Scenario No.: _2____ Event No.: __2___

Event Description: VCT level Transmitter LT 185 Fails **HIGH**.

No audible alarm , but actual VCT level will decrease at the rate of letdown flow.

No specific procedure direction. This will test system knowledge & diagnostic skills. Long term success path is placing LV112A in the VCT position

	SRO	Receive report from RO that LT-185 has failed HIGH.
		Review ARP 17007, E-5 for guidance.
		Determine what to do (not proceduralized) Use a method to stop diverting. 2 Methods to accomplish this: A. Go to hard VCT on the Divert valve. B. Run down the controller on 1 LIC-185 close valve and leave the divert in the AUTO position.
		Inform Operations Duty Manager.
		Inform I& C and Maintenance.
	BOP	Support RO and SRO as directed.

Op-Test No.: _____ Scenario No.: __2___ Event No.: _3____

Event Description: High shaft Vibration alert for RCP # 1. This will cause the crew to have to decrease power. RCP procedure 13003-1, RCP Operation states that the RCP should be shutdown when shaft vibration is 20 mils or greater and the frame vibration is 5 mils or greater. The malfunction should not go tha high. This would allow the operators to decrease power to get credit for a reactivity manipulation.

Local panel indicates 16 mils shaft vibration and steady on RCP #1. Frame vibs are all ~2 mils for all RCPs. Shafts of other RCPs are about 5 to 7 mils

Prompt to ramp power down if consult OPS management

Standing order to monitor RCP #1 vibrations hourly. RCP should be shutdown within 4 hours if shaft vibration exceeds 15 mils

Time	Position	Applicant's Actions or Behavior
	RO/SRO	Acknowledges the following annunciators: ALB-08 E-4 RCP SHAFT VIB ALERT, p.18 of 17008
	SRO	ALB- E-4, Dispatch an operator to the Vibration Monitoring Panel and Identify the RCP causing the alarm. Continue operation of the Affected RCP. Refer to 13003-1, RCP Operation.
	SRO	Due to confirmed alarm and standing order reduce power using 18013-C, Rapid Power Reduction.
		Direct RO and BOP to reduce power at a rate of approximately 5% per min.

Op-Test No.: _____ Scenario No.: __2___ Event No.: _3____

Event Description: High shaft Vibration alert for RCP # 1. This will cause the crew to have to decrease power. RCP procedure 13003-1, RCP Operation states that the RCP should be shutdown when shaft vibration is 20 mils or greater and the frame vibration is 5 mils or greater. The malfunction should not go that high. This would allow the operators to decrease power to get credit for a reactivity manipulation.

Local panel indicates 16 mils shaft vibration and steady on RCP #1. Frame vibs are all ~2 mils for all RCPs. Shafts of other RCPs are about 5 to 7 mils

Prompt to ramp power down if consult OPS management

Standing order to monitor RCP #1 vibrations hourly. RCP should be shutdown within 4 hours if shaft vibration exceeds 15 mils

	RO	Initiate a boration as necessary to maintain Tavg within 3 deg of Tref. Energize all back up heaters.
	SRO	AOP 18013 Notify System Load dispatcher. Make Notifications IAW 10000-C, Conduct of Operations (After Scenario). Emergency Classification, Federal and State Reporting Requirements.
	RO	Monitor and maintain in bands: PRZR PRESSURE PRZR LEVEL, SG LEVEL

Op-Test No.: _____ Scenario No.: _2___ Event No.: __4__

Event Description: During the power decrease the plant will get a loose parts monitor alarm 17063-1, A05. Metal Impact MON SYS PNL Alarm will come in. This will require the crew to enter procedure 18039-C, Confirmed Loose Part in the RCS or Steam Generator Secondary Side. This will represent the RCP pump breaking and making its way to the Steam Generator.

The crew should implement 18039-C. This may cause the crew to use the Rapid Power Reduction procedure, 18013-C.

This will cause a tube leak in the # 1S/G. Corresponding to the # 1 RCP problem. The crew would also initiate 18009-C, SG Tube leak. (Large)

Ultimately, the tube leak will escalate until there is a tube rupture.

Have the SG ARV on the # 1 Steam Generator triggered to stick open on the reactor trip by use of the controller up override. Manual control from the control room is not available. However, .local isolation will isolate the ARV. May have to go to 19020-C, FAULTED STEAM GENERATOR ISOLATION. Depending on the crew's actions and the time it takes them to get a person out to the ARV for manual operations.

Automatic actuation of SI will not occur. The operators will have to manually actuate SI via the main control board switches. Bit valve 8801A will not automatically nor will it manually reposition. One flow path through the BIT will not function.

Only the A train will work on the Manual SI. Will have to Manually lineup the B train. The cross connect will have flow through the 8801 B valve.

Time	Position	Applicant's Actions or Behavior
	RO	Reports: ALB-063 A-5 METAL IMPACT MON SYS PNL ALARM. p. 9 of 29
	SRO	Section 4 17063 Window A-05 Step 1 Dispatch an operator to look at the LOCAL panel DMIMS alarm.
		Step 4 Notify Shift Superintendent of alarm condition. Step 5 If impacts can be heard on the audio channel, NOTIFY Plant Duty Manager.

Op-Test No.: _____ Scenario No.: _2___ Event No.: __4__

Event Description: During the power decrease the plant will get a loose parts monitor alarm 17063-1, A05. Metal Impact MON SYS PNL Alarm will come in. This will require the crew to enter procedure 18039-C, Confirmed Loose Part in the RCS or Steam Generator Secondary Side. This will represent the RCP pump breaking and making its way to the Steam Generator.

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Automatic actuation of SI will not occur. The operators will have to manually actuate SI via the main control board switches. Bit valve 8801A will not automatically nor will it manually reposition. One flow path through the BIT will not function.

Only the A train will work on the Manual SI. Will have to Manually lineup the B train. The cross connect will have flow through the 8801 B valve.

		Initiate 18039-C, Confirmed Loose Parts in the RCS or Steam Generator Secondary Side."
		Check for confirmed DMIMS tape analysis.
	BOP	Receives report from the Dispatched operator that this was a confirmed hits alarm. On the # 1 SG
		(Tube Leak comes in on the # 1 SG)
	ALL	Acknowledges and reports following alarms: ALB -05 B-3 INTMD RADIATION ALARM ALB -05 C-3 HIGH RADIATION ALARM
	SRO	Directs and enters AOP 18009-C, Steam Generator Tube Leak Rev.16
		Directs RO to start additional CCPs as necessary. (PDP is OOC)

Op-Test No.: _____ Scenario No.: _2___ Event No.: __4__

Event Description: During the power decrease the plant will get a loose parts monitor alarm 17063-1, A05. Metal Impact MON SYS PNL Alarm will come in. This will require the crew to enter procedure 18039-C, Confirmed Loose Part in the RCS or Steam Generator Secondary Side. This will represent the RCP pump breaking and making its way to the Steam Generator.

The crew should implement 18039-C. This may cause the crew to use the Rapid Power Reduction procedure, 18013-C.

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Automatic actuation of SI will not occur. The operators will have to manually actuate SI via the main control board switches. Bit valve 8801A will not automatically nor will it manually reposition. One flow path through the BIT will not function.

Only the A train will work on the Manual SI. Will have to Manually lineup the B train. The cross connect will have flow through the 8801 B valve.

	RO	Adjust flow using FV-0121 and or start additional CCPs (A only available)
		A.2 Reduce letdown to 45 gpm IAW 13006
	SRO	A.4 Direct Chemistry And HP to sample (SMART) for specific activity in the locations. All S/Gs. Should start with # 1 SG due to the impingement of loose parts. Confirmed.
		Check leak increasing. Continue in the rapid shutdown procedure IAW 18013-C
	ALL	A5. Identify leaking SG if possible.
		A6 Dispatch an operator to Xfer SJAE and SPE to filter units using 13310 Turbine building HVAC system. Isolate the CST Notify Radwaste. Xfer aux steam loads.

Op-Test No.: _____ Scenario No.: _2___ Event No.: __4__

Event Description: During the power decrease the plant will get a loose parts monitor alarm 17063-1, A05. Metal Impact MON SYS PNL Alarm will come in. This will require the crew to enter procedure 18039-C, Confirmed Loose Part in the RCS or Steam Generator Secondary Side. This will represent the RCP pump breaking and making its way to the Steam Generator.

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Automatic actuation of SI will not occur. The operators will have to manually actuate SI via the main control board switches. Bit valve 8801A will not automatically nor will it manually reposition. One flow path through the BIT will not function.

Only the A train will work on the Manual SI. Will have to Manually lineup the B train. The cross connect will have flow through the 8801 B valve.

	RO/SRO	A7. Maintain VCT level auto/manual make up.
	All	A8. Partially isolate the leaking SG. Shut blowdown Raise SG ARV setpoint to 1160 (7.73) Shut Steam Supply to TDAFW pump.
	ALL	Manually trip reactor when PRZR level cannot be maintained. Enter E-0, Reactor Trip or Safety injection. After reactor trip.
	RO	Perform immediate operator actions of E-0. Verify Rx trip: Rod bottom lights lit Reactor trip and bypass breakers OPEN Neutron Flux lowering.

Op-Test No.: _____ Scenario No.: _2___ Event No.: __4__

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The crew should implement 18039-C. This may cause the crew to use the Rapid Power Reduction procedure, 18013-C.

This will cause a tube leak in the # 1S/G. Corresponding to the # 1 RCP problem. The crew would also initiate 18009-C, SG Tube leak. (Large)

Ultimately, the tube leak will escalate until there is a tube rupture.

Have the SG ARV on the # 1 Steam Generator triggered to stick open on the reactor trip by use of the controller up override. Manual control from the control room is not available. However, .local isolation will isolate the ARV. May have to go to 19020-C, FAULTED STEAM GENERATOR ISOLATION. Depending on the crew's actions and the time it takes them to get a person out to the ARV for manual operations.

Automatic actuation of SI will not occur. The operators will have to manually actuate SI via the main control board switches. Bit valve 8801A will not automatically nor will it manually reposition. One flow path through the BIT will not function.

Only the A train will work on the Manual SI. Will have to Manually lineup the B train. The cross connect will have flow through the 8801 B valve.

	BOP	Verify turbine trip: All turbine stop valves SHUT Verify power to AC emergency busses: 4160 AC 1E busses. AC emergency busses ALL ENERGIZED 4160 AC 1E busses. 480V AC 1E busses.
	SRO	Direct actions of E-0,
		See attached copy of E-0
	BOP	Recognize the # 1 SG ARV has failed open. (**Critical Task**)

Op-Test No.: _____ Scenario No.: _2___ Event No.: __4__

Event Description: During the power decrease the plant will get a loose parts monitor alarm 17063-1, A05. Metal Impact MON SYS PNL Alarm will come in. This will require the crew to enter procedure 18039-C, Confirmed Loose Part in the RCS or Steam Generator Secondary Side. This will represent the RCP pump breaking and making its way to the Steam Generator.

The crew should implement 18039-C. This may cause the crew to use the Rapid Power Reduction procedure, 18013-C.

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Automatic actuation of SI will not occur. The operators will have to manually actuate SI via the main control board switches. Bit valve 8801A will not automatically nor will it manually reposition. One flow path through the BIT will not function.

Only the A train will work on the Manual SI. Will have to Manually lineup the B train. The cross connect will have flow through the 8801 B valve.

	RO	Recognize/Identify SI train B did not actuate automatically or manually. Step 17 of E-0 Requires a full manual alignment IAW E-0 Appendix C. See Appendix C for valves alignment. Attached. (Critical Task) In order to inject from the B SI train, must manually align the B train SI pump and valves. (**Critical Task**)
	SRO	Direct RO/BOP to align the B train of ECCS to all injection from the B SI pump through the BIT valves. (**Critical Task**)
	BOP	Verify if EDGs are running.
	SRO	AT E-0 STEP 24 check Secondary pressure boundaries. RNO GO to 19020-C. E-2 Faulted Steam Generator Isolation. (May go to E-3 first then E-2 either is correct)

Op-Test No.: _____ Scenario No.: _2___ Event No.: __4__

Event Description: During the power decrease the plant will get a loose parts monitor alarm 17063-1, A05. Metal Impact MON SYS PNL Alarm will come in. This will require the crew to enter procedure 18039-C, Confirmed Loose Part in the RCS or Steam Generator Secondary Side. This will represent the RCP pump breaking and making its way to the Steam Generator.

The crew should implement 18039-C. This may cause the crew to use the Rapid Power Reduction procedure, 18013-C.

This will cause a tube leak in the # 1S/G. Corresponding to the # 1 RCP problem. The crew would also initiate 18009-C, SG Tube leak. (Large)

Ultimately, the tube leak will escalate until there is a tube rupture.

Have the SG ARV on the # 1 Steam Generator triggered to stick open on the reactor trip by use of the controller up override. Manual control from the control room is not available. However, .local isolation will isolate the ARV. May have to go to 19020-C, FAULTED STEAM GENERATOR ISOLATION. Depending on the crew's actions and the time it takes them to get a person out to the ARV for manual operations.

Automatic actuation of SI will not occur. The operators will have to manually actuate SI via the main control board switches. Bit valve 8801A will not automatically nor will it manually reposition. One flow path through the BIT will not function.

Only the A train will work on the Manual SI. Will have to Manually lineup the B train. The cross connect will have flow through the 8801 B valve.

		At E-0 STEP 25, secondary radiation levels, RNO GO to 19030-C, Steam Generator Tube Rupture.
	ALL	Transition to 19020-C, Faulted SG Isolation
		Identify faulted S/G, # 1 SG
	SRO	Direct BOP to isolate feed water isolation valves for the # 1 SG
	BOP	Shut HV 5227 MFIV HV-15196 BFIV HV-5139 SG1 from MDAFW pump 1 HV-5122 SG 1 from TDAFW pump TDAFW supply valves HV-3009 SG1 Blowdown, HV-7603A Sample ORC HV-9451
	SRO	Step 6b Secondary Radiation NORMAL, RNO GO TO 19030-C, E-3 Steam Generator Tube Rupture.
		Transition to E-3.

Op-Test No.: _____ Scenario No.: _2___ Event No.: __4__

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The crew should implement 18039-C. This may cause the crew to use the Rapid Power Reduction procedure, 18013-C.

This will cause a tube leak in the # 1S/G. Corresponding to the # 1 RCP problem. The crew would also initiate 18009-C, SG Tube leak. (Large)

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Have the SG ARV on the # 1 Steam Generator triggered to stick open on the reactor trip by use of the controller up override. Manual control from the control room is not available. However, .local isolation will isolate the ARV. May have to go to 19020-C, FAULTED STEAM GENERATOR ISOLATION. Depending on the crew's actions and the time it takes them to get a person out to the ARV for manual operations.

Automatic actuation of SI will not occur. The operators will have to manually actuate SI via the main control board switches. Bit valve 8801A will not automatically nor will it manually reposition. One flow path through the BIT will not function.

Only the A train will work on the Manual SI. Will have to Manually lineup the B train. The cross connect will have flow through the 8801 B valve.

	BOP	At step # 3 of E-3 should identify that the # 1 ARV has failed OPEN. **(Critical Task)** Report to the SRO that the ARV has not closed.
	SRO	Direct outside operator to Locally isolate the # 1 SG ARV. **(CRITICAL TASK)**
		Isolate the # 1 S/G **(Critical Task)** prior to exiting E-3.
	SRO/BOP	Shut the MSL and MSL bypass valves (Step 3.e E-3), if not already done.
		Maintain S/G level in the ruptured SG greater than 10%, Stop feed to the ruptured SG
	RO	RESET SI and Phase A
	BOP	Establish Instrument Air to the Containment.

Op-Test No.: _____ Scenario No.: _2___ Event No.: __4__

Event Description: During the power decrease the plant will get a loose parts monitor alarm 17063-1, A05. Metal Impact MON SYS PNL Alarm will come in. This will require the crew to enter procedure 18039-C, Confirmed Loose Part in the RCS or Steam Generator Secondary Side. This will represent the RCP pump breaking and making its way to the Steam Generator.

The crew should implement 18039-C. This may cause the crew to use the Rapid Power Reduction procedure, 18013-C.

This will cause a tube leak in the # 1S/G. Corresponding to the # 1 RCP problem. The crew would also initiate 18009-C, SG Tube leak. (Large)

Ultimately, the tube leak will escalate until there is a tube rupture.

Have the SG ARV on the # 1 Steam Generator triggered to stick open on the reactor trip by use of the controller up override. Manual control from the control room is not available. However, .local isolation will isolate the ARV. May have to go to 19020-C, FAULTED STEAM GENERATOR ISOLATION. Depending on the crew's actions and the time it takes them to get a person out to the ARV for manual operations.

Automatic actuation of SI will not occur. The operators will have to manually actuate SI via the main control board switches. Bit valve 8801A will not automatically nor will it manually reposition. One flow path through the BIT will not function.

Only the A train will work on the Manual SI. Will have to Manually lineup the B train. The cross connect will have flow through the 8801 B valve.

	SRO	At step 14 of E-3, initiate cooldown of RCS.
		Determine required core exit TARGET temperature. Direct BOP cooldown of RCS.
	BOP	Cooldown RCS to the determined target temperature. Using ARVs.
	SRO	Determine Emergency Classification as Site Area on Barriers. Based on: Loss of RCS Barrier #2 and # 3 on Figure 2 Loss of CNTMT Barrier # 4 on Figure 3

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EMERGENCY OPERATING PROCEDURE

E-0 REACTOR TRIP OR SAFETY INJECTION

PURPOSE — PRB REVIEW REQUIRED

This procedure provides actions to verify proper response of the automatic protection systems following manual or automatic actuation of a reactor trip or safety injection, to evaluate plant conditions, and to identify the appropriate recovery procedure. (Applicable in modes 1, 2 and 3)

SYMPTOMS

The symptoms are:

- Any symptom that requires a reactor trip, as listed in ATTACHMENT A, if it has not occurred.
- The following are symptoms of a reactor trip:
  - a. Any reactor trip annunciator lit.
  - b. Rapid lowering of neutron level indicated by nuclear instrumentation.
  - c. All shutdown and control rods fully inserted (rod bottom lights lit).
- The following are symptoms that require a reactor trip and safety injection, if one has not occurred:
  - a. PRZR pressure less than or equal to 1870 psig.
  - b. Steamline pressure less than or equal to 585 psig.
  - c. Containment pressure greater than or equal to 3.8 psig.
- The following are symptoms of a reactor trip and safety injection:
  - a. Any SI annunciator lit.
  - b. SI ACTUATED BPLB window lit.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
IMMEDIATE OPERATOR ACTIONS	

NOTE: Foldout page should be continuously monitored and applicable actions taken.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. Verify reactor trip: • Rod bottom lights-LIT. • Reactor trip and bypass breakers-OPEN. • Neutron flux-lowering.	1. Trip reactor using both reactor trip handswitches on the QMCB. IF reactor NOT tripped, THEN go to 19211-C, FR-S.1 RESPONSE TO NUCLEAR POWER GENERATION/ATWT.
2. Verify turbine trip: • All turbine stop valves - SHUT.	2. Trip turbine. IF turbine will NOT trip, THEN run back turbine. IF turbine cannot be run back, THEN shut main steam line isolation valves and bypass valves.
3. Verify power to AC emergency busses:	
a. AC emergency busses - AT LEAST ONE ENERGIZED: • 4160V AC 1E busses.	a. Try to restore power to at least one AC emergency bus. IF power can NOT be restored to at least one AC emergency bus, THEN go to 19100-C, ECA-0.0 LOSS OF ALL AC POWER.
b. AC emergency busses - ALL ENERGIZED: • 4160V AC 1E busses. • 480V AC 1E busses.	b. Try to restore power to de-energized AC emergency bus while continuing with Step 4.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. Check if SI is actuated: • Any SI annunciator - LIT. • SI ACTUATED BPLB window - LIT.	4. Check if SI is required: <u>IF</u> one or more of the following conditions has occurred: • PRZR pressure less than or equal to 1870 psig. • Steam line pressure less than or equal to 585 psig. • Containment pressure greater than or equal to 3.8 psig. • Automatic alignment of ECCS equipment to injection phase. <u>THEN</u> SI is required. <u>IF</u> SI is required, <u>THEN</u> actuate. <u>IF</u> SI is <u>NOT</u> required, <u>THEN</u> go to 19001-C, ES-0.1 REACTOR TRIP RESPONSE.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
SUBSEQUENT OPERATOR ACTIONS	
5. Verify FW Isolation: • MFIVs - SHUT. • BFIVs - SHUT. • MFRVs - SHUT. • BFRVs - SHUT.	5. Shut valves as necessary.
6. Verify MLB indications for both trains of ECCS equipment aligning for injection phase.	6. Actuate SI.
7. Verify containment isolation Phase A - ACTUATED: a. CI-A MLB indicators - CORRECT FOR SI.	7. Actuate Phase A. IF valves do not shut, THEN shut valves.
8. Verify AFW pumps running:	
a. MDAFW pumps - RUNNING.	a. Start pumps.
b. SG blowdown isolated: • SG blowdown isolation valves - SHUT WITH HANDSWITCHES IN CLOSE. • SG sample isolation valves - SHUT.	b. Shut valves.
c. Turbine-driven pump - RUNNING IF ANY OF THE FOLLOWING CONDITIONS EXISTS: • LO-LO LEVEL IN TWO OR MORE SGs. • BLACKOUT.	c. Open TDAFW pump steam supply valve HV-5106.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. Check charging and other ECCS pumps:	
a. Verify ECCS pumps running: • CCPs - RUNNING. • SI Pumps - RUNNING. • RHR Pumps - RUNNING.	a. Start ECCS pumps.
b. (Unit 2 only) NCP - <u>NOT</u> RUNNING	b. (Unit 2 only) Trip the NCP if it is running.
10. Verify CCW Pumps - TWO RUNNING EACH TRAIN.	10. Start or stop pumps to ensure two pumps running on each train.
11. Verify NSCW Pumps - TWO RUNNING EACH TRAIN.	11. Start or stop pumps to ensure two pumps running on each train.
12. Verify containment cooling units:	
a. Fans - RUNNING IN LOW SPEED: • MLB indicators - CORRECT FOR SI.	a. Start fans in low speed.
b. NSCW cooler isolation valves - OPEN: • MLB indicators - CORRECT FOR SI.	b. Open valves.
13. Verify containment ventilation isolation:	
a. Dampers and valves - SHUT: • MLB indicators - CORRECT FOR SI.	a. Shut dampers and valves.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14. Check if main steamlines should be isolated:	
a. Check one or more of the following conditions: • Any steamline pressure - EQUAL TO OR LESS THAN 585 PSIG. • Containment pressure by recording - GREATER THAN 14.5 PSIG. • Low Steam Pressure SI/SLI - BLOCKED <u>AND</u> High Steam Pressure Rate - ON TWO OR MORE CHANNELS OF ANY STEAMLINE.	a. Go to Step 15.
b. Verify main steamline isolation and bypass valves - SHUT.	b. Shut valves.
15. Check containment spray - NOT REQUIRED:	
a. Containment pressure - HAS REMAINED LESS THAN 21.5 PSIG BY PRESSURE RECORDING.	a. Perform the following: 1) Verify containment spray initiated. <u>IF NOT</u>, <u>THEN</u> actuate. 2) Verify containment spray pumps running. 3) Verify containment spray pump discharge valves open.
16. Verify diesel generators - RUNNING.	16. Start both DGs.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION: Evacuate non-essential personnel from containment if conditions warrant.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17. Verify ECCS flows:	
a. CCP flow indicators - CHECK FOR BIT FLOW.	a. Align valves using ATTACHMENT B.
b. RCS pressure - LESS THAN 1625 PSIG.	b. Go to Step 18.
c. SI pump flow indicators - CHECK FOR FLOW.	c. Align valves using ATTACHMENT C.
d. RCS pressure - LESS THAN 300 PSIG.	d. Go to Step 18.
e. RHR pump flow indicators - CHECK FOR FLOW.	e. Align valves using ATTACHMENT D.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE:

- The generator output breakers should trip open approximately 30 seconds after a turbine trip.
- If breakers do not trip open, refer to actions of 17031, Window E04.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*18. Verify total AFW flow - GREATER THAN 570 GPM.	*18. IF SG NR level in any SG greater than 10% [32% ADVERSE], THEN control feed flow to maintain NR level. Continue with Step 19. IF NR level in all SGs less than 10% [32% ADVERSE], THEN start pumps and align valves as necessary. IF NR level in all SGs less than 10% [32% ADVERSE], AND total AFW flow greater than 570 gpm can NOT be established, THEN go to 19231-C, FR-H.1 RESPONSE TO LOSS OF SECONDARY HEAT SINK.
19. Verify ECCS valve alignment - PROPER INJECTION LINEUP INDICATED ON MLBs.	19. Align valves using Attachments B, C and D as necessary.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*20. Verify RCS temperatures - • Any RCP running - VERIFY RCS AVERAGE TEMPERATURE STABLE AT OR TRENDING TO 557° F. -OR- • No RCP running - VERIFY RCS COLD LEG TEMPERATURES STABLE AT OR TRENDING TO 557° F.	*20. IF temperature less than 557° F and lowering, THEN perform the following: a. Stop dumping steam. b. IF cooldown continues, THEN lower total feed flow. IF all SG NR levels less than 10% [32% ADVERSE], THEN maintain total feed flow greater than 570 gpm. c. IF cooldown continues, THEN perform one or more of the following to stop cooldown: • Trip both MFPs. • Shut MSIVs and BSIVs. IF temperature greater than 557° F and rising, THEN: • Dump steam to condenser. -OR- • Dump steam using SG ARVs.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION: A PRZR PORV block valve which was shut to isolate an excessively leaking or open PRZR PORV should not be opened unless used to prevent challenging the PRZR safeties.

21. Verify PRZR PORVs, block valves, and spray valves:	
a. PRZR PORVs-SHUT AND IN AUTO.	a. IF PRZR pressure less than 2315 psig, THEN shut PRZR PORVs. IF a PRZR PORV can NOT be shut, THEN shut its block valve. IF block valve can NOT be shut, THEN go to 19010-C, E-1 LOSS OF REACTOR OR SECONDARY COOLANT. Maintain RCS pressure less than 2400 psig to prevent lifting PRZR safeties.

NOTE: When PRZR pressure is greater than 2260 psig, PRZR spray is required. Spray valves should be shut if the associated RCP 4 or RCP 1 is not running to prevent loss of spray effectiveness.

b. Normal PRZR spray valves-shut.	b. IF PRZR pressure less than 2260 psig, THEN shut spray valves. IF valves can NOT be shut, THEN stop RCP 4. IF PRZR pressure continues lowering, THEN stop RCP 1.
c. Power to at least one block valve-AVAILABLE.	c. Go to step 22. OBSERVE NOTE PRIOR TO STEP 22.
d. PRZR PORV block valves-AT LEAST ONE OPEN.	d. IF RCS pressure is greater than 2185 psig, THEN open at least one PRZR PORV block valve.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE: Seal injection flow should be maintained to all RCPs.	
*22. Check if RCPs should be stopped:	
a. Check ECCS pumps - AT LEAST ONE RUNNING: • CCPs or SI pumps.	a. Go to Step 23.
b. Check RCP trip parameter - RCS PRESSURE LESS THAN 1375 PSIG.	b. Go to Step 23.
c. Stop all RCPs.	
*23. Verify at least one ACCW pump - RUNNING.	*23. Try to start one ACCW pump. a. IF an ACCW pump can NOT be started within 10 minutes of loss of ACCW, THEN stop all RCPs. b. IF an ACCW pump can NOT be started within 30 minutes of loss of ACCW, THEN shut ACCW containment isolation valves: • ACCW SPLY HDR ORC ISO VLV HV-1979 • ACCW SPLY HDR IRC ISO VLV HV-1978 • ACCW RTN HDR IRC ISO VLV HV-1974 • ACCW RTN HDR ORC ISO VLV HV-1975

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
24. Check SGs secondary pressure boundaries:	
a. Check pressures in all SGs - • NO SG PRESSURE LOWERING IN AN UNCONTROLLED MANNER. • NO SG COMPLETELY DEPRESSURIZED.	a. Go to 19020-C, E-2 FAULTED STEAM GENERATOR ISOLATION.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION: The steam generator sample valves should be opened one at a time and shut prior to opening another sample valve.

25. Check secondary radiation - NORMAL:

    a. Open SG sample valves and direct chemistry to take periodic activity samples of all SGs:

SG	SAMPLE VALVE
• 1	HV-9451
• 2	HV-9452
• 3	HV-9453
• 4	HV-9454

    b. Secondary radiation - NORMAL:

    RESPONSE NOT OBTAINED: b. Go to 19030-C, E-3 STEAM GENERATOR TUBE RUPTURE.

    1) MAIN STM LINE MONITORS:

       - RE-13120 (SG 1)
       - RE-13121 (SG 2)
       - RE-13122 (SG 3)
       - RE-13119 (SG 4)

    2) CNDSR AIR EJCTR/STM RAD MONITORS:

       - RE-12839C
       - RE-12839D*
       - RE-12839E*

       (* - if onscale)

    3) STM GEN LIQ PROCESS RAD:

       - RE-0019 (Sample)
       - RE-0021 (Blowdown)

    4) SG sample radiation.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
26. Check if RCS is intact inside containment: • Containment radiation - NORMAL. • Containment pressure - NORMAL. • Containment emergency recirculation sump levels - NORMAL.	26. Go to 19010-C, E-1 LOSS OF REACTOR OR SECONDARY COOLANT.
*27. Check if ECCS flow should be reduced:	
a. RCS subcooling - GREATER THAN 24°F.	a. Go to Step 28
b. Secondary heat sink: • Total AFW flow to SGs - GREATER THAN 570 GPM. -OR- • NR level in at least one SG - GREATER THAN 10%.	b. IF neither condition satisfied, THEN go to Step 28.
c. RCS pressure - STABLE OR RISING.	c. Go to Step 28.
d. PRZR level - GREATER THAN 9%.	d. Try to stabilize RCS pressure with normal PRZR spray. Return to Step 27a.
e. Go to 19011-C, ES-1.1 SI TERMINATION	
*28. Initiate monitoring of critical safety function status trees.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION: Switching to alternate CST by initiating 13610, AUXILIARY FEEDWATER SYSTEM will be necessary when CST level lowers to less than 15%.

NOTE: 91001, EMERGENCY CLASSIFICATION AND IMPLEMENTING PROCEDURE should be implemented at this time.

*29. Check SG levels:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
a. Check NR levels - GREATER THAN 10%.	a. IF all SGs NR levels less than 10%, THEN maintain total feed flow greater than 570 gpm.
b. Control feed flow to maintain NR levels between 10% and 65%.	b. IF NR level in any SG continues to rise in an uncontrolled manner, THEN go to 19030-C, E-3 STEAM GENERATOR TUBE RUPTURE.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
30. Check Auxiliary Building leak detection systems:	30. Evaluate cause of abnormal conditions.
a. Check PLANT VENT radiation monitors - NORMAL:	IF cause is loss of RCS inventory, THEN go to 19112-C, ECA-1.2 LOCA OUTSIDE CONTAINMENT.
• Plant vent monitors:	
• RE-12442A - EFFL PART	
• RE-12442B - EFFL IODINE	
• RE-12442C - EFFL RAD	
• RE-12444C - RADIOGAS RAD	
b. Check Auxiliary Building break detection system on PCP - NO LEAK DETECTION STATUS LIGHT LIT.	
31. Check PRT conditions - NORMAL:	31. Evaluate cause of abnormal conditions using ATTACHMENT E.
• PRZR PORV and safety valve tailpipe temperatures - LESS THAN 190°F.	IF cause of abnormal conditions is a continuing loss of RCS inventory, THEN go to 19010-C, E-1 LOSS OF REACTOR OR SECONDARY COOLANT.
• Temperature - LESS THAN 115°F.	
• Level - BETWEEN 57% AND 88%.	
• Pressure - BETWEEN 3 PSIG AND 8 PSIG.	

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

CAUTION: If offsite power is lost after SI reset, action is required to restart the following ESF equipment if plant conditions require their operation:

- RHR Pumps
- SI Pumps
- Post-LOCA Cavity Purge Units
- Containment Coolers in low speed (Started in high speed on a UV signal).
- ESF Chilled Water Pumps (If CRI is reset).

32. Reset SI.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION: The steam generator sample valves should be opened one at a time and shut prior to opening another sample valve.

*33. Check secondary radiation - NORMAL:

a. Open SG sample valves and direct chemistry to take periodic activity samples of all SGs:

SG	SAMPLE VALVE
• 1	HV-9451
• 2	HV-9452
• 3	HV-9453
• 4	HV-9454

b. Secondary radiation - NORMAL.

1) MAIN STM LINE MONITORS:

- RE-13120 (SG 1)
- RE-13121 (SG 2)
- RE-13122 (SG 3)
- RE-13119 (SG 4)

2) CNDSR AIR EJCTR/STM RAD MONITORS:

- RE-12839C
- RE-12839D*
- RE-12839E*
(* - if onscale)

3) STM GEN LIQ PROCESS RAD:

- RE-0019 (Sample)
- RE-0021 (Blowdown)

4) SG sample radiation.

RESPONSE NOT OBTAINED:

b. Go to 19030-C, E-3 STEAM GENERATOR TUBE RUPTURE.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION: Repositioning Phase A isolation valves may cause radiation problems throughout the plant.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
34. Reset containment isolation Phase A.	34. Go to Step 36.
35. Establish instrument air to containment:	
a. Verify instrument air pressure - GREATER THAN 100 PSIG.	a. Start additional air compressors to establish instrument air pressure greater than 100 psig by initiating 13710, SERVICE AIR SYSTEM.
b. Open INSTR AIR CNMT ISO VLV HV-9378 using handswitches HS-9378A and HS-9378B.	

CAUTION: RCS pressure should be monitored. If RCS pressure lowers in an uncontrolled manner to less than 300 psig, the RHR pumps should be restarted to supply water to the RCS.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*36. Check if RHR pumps should be stopped:	
a. Check RCS pressure:	
1) Pressure - GREATER THAN 300 PSIG.	1) Go to 19010-C, E-1 LOSS OF REACTOR OR SECONDARY COOLANT.
2) Pressure - STABLE OR RISING.	2) Go to Step 37.
b. Stop RHR pumps.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*37. Check if diesel generators should be stopped:	
a. Verify AC emergency busses - ENERGIZED BY OFFSITE POWER.	a. WHEN offsite power available, THEN restore power to Emergency AC busses by initiating 13427, 4160V AC ELECTRICAL DISTRIBUTION. IF offsite power NOT available, THEN restore power to 480V switchgear from the emergency DGs: UNIT 1: • 1NB01 • 1NB10 UNIT 2: • 2NB01 • 2NB10
b. Stop any unloaded DG and place in standby by initiating 13145, DIESEL GENERATORS.	
c. Verify 480V switchgear energized. UNIT 1: • 1NB01 • 1NB10 UNIT 2: • 2NB01 • 2NB10	c. Energize 480V switchgear. UNIT 1: • 1NB01 • 1NB10 UNIT 2: • 2NB01 • 2NB10
38. Return to Step 20.	

END OF PROCEDURE TEXT

Sheet 1 of 2

ATTACHMENT A

SYMPTOMS REQUIRING REACTOR TRIP

	PARAMETER	SETPOINT
1.	Safety Injection	NA
2.	PR Neutron Flux High	
	a. High Setpoint	109%
	b. Low Setpoint (P-10 interlock)	25%
3.	PR Neutron Flux High Positive Rate	+5% in 2 sec.
4.	IR Neutron Flux High (P-10 interlock)	25%
5.	SR Neutron Flux High (P-6 interlock)	10^5 cps
6.	Overtemperature dT	Displayed on: TI-411C, TI-421C, TI-431C, TI-441C
7.	Overpower dT	Displayed on: TI-411B TI-421B TI-431B TI-441B
8.	Pressurizer Pressure Low (P-7 interlock)	1960 psig
9.	Pressurizer Pressure High	2385 psig
10.	Pressurizer Water Level High (P-7 interlock)	92%
11.	RCS Loss of Flow	
	a. Single Loop (P-8 interlock)	90%
	b. Two or More Loops (P-7 interlock)	90%

Sheet 2 of 2

ATTACHMENT A (Cont'd)

SYMPTOMS REQUIRING REACTOR TRIP

	PARAMETER	SETPOINT
12.	Reactor Coolant Pump Bus Undervoltage (P-7 interlock)	9600V
13.	Reactor Coolant Pump Bus Underfrequency (P-7 interlock)	57.3 Hz
14.	Steam Generator Water Level Lo-Lo	38% NR
15.	Turbine Trip (P-9 interlocks)	
	a. Turbine Stop Valve Closure	Less Than 96.7% Open
	b. Emergency Trip System Pressure Low	580 psig
16.	Solid State Protection System Malfunction	General Warning Alarm, Both Trains

END OF ATTACHMENT A

Sheet 1 of 2

ATTACHMENT B

VALVE LINEUP FOR CCP COLD LEG INJECTION THROUGH THE BIT

VALVE NUMBER	FUNCTION	POSITION	POSITION INDICATION
1204-U4-207	RWST SUPPLY TO ECCS	OPEN	LOCAL (RWST)
LV-112D	RWST TO CCP A&B SUCTION	OPEN	MLB09
LV-112E	RWST TO CCP A&B SUCTION	OPEN	MLB10
LV-112B	VCT OUTLET ISOLATION	SHUT	MLB05
HV-8471A	CCP-A SUCTION	OPEN	MLB01
HV-8509B	CCP-A RV TO RWST ISOLATION	OPEN	MLB04
HV-8509A	CCP-B RV TO RWST ISOLATION	OPEN	MLB03
HV-8471B	CCP-B SUCTION	OPEN	MLB02
LV-112C	VCT OUTLET ISOLATION	SHUT	MLB06
HV-8508A	CCP-A RV TO RWST ISOLATION	ENABLED	MLB09
HV-8508B	CCP-B RV TO RWST ISOLATION	ENABLED	MLB10
HV-8485A	CCP-A DISCHARGE ISOLATION	OPEN	MLB01
HV-8111A	CCP-A MINIFLOW	SHUT	MLB06
HV-8111B	CCP-B MINIFLOW	SHUT	MLB06
HV-8485B	CCP-B DISCHARGE ISOLATION	OPEN	MLB02
HV-8438	CCP DISCHARGE HEADER CROSSCONNECT	OPEN	MLB02
HV-8105	CHARGING TO RCS ISOLATION	SHUT	MLB06
HV-8801A	BIT DISCH ISOLATION	OPEN	MLB05
HV-8116	SAFETY GRADE CHARGING TO REGEN HX	SHUT	MLB01

Sheet 2 of 2

ATTACHMENT B (Cont'd)

VALVE LINEUP FOR CCP COLD LEG INJECTION THROUGH THE BIT

VALVE NUMBER	FUNCTION	POSITION	POSITION INDICATION
HV-8110	CCP-A&B COMMON MINIFLOW	SHUT	MLB05
HV-8801B	BIT DISCH ISOLATION	OPEN	MLB06
HV-8106	CHARGING TO RCS ISOLATION	SHUT	MLB05
HV-8924	SI PMP-A SUCTION XCONN TO CCP	OPEN	MLB01

END OF ATTACHMENT B

Sheet 1 of 1

ATTACHMENT C

VALVE LINEUP FOR SIP COLD LEG INJECTION

VALVE NUMBER	FUNCTION	POSITION	POSITION INDICATION
1204-U4-207	RWST SUPPLY TO ECCS	OPEN	LOCAL (RWST)
HV-8807A	SI PMP-A SUCTION XCONN TO CCP SUCTION HEADER	SHUT	MLB03
HV-8807B	SI PMP-A SUCTION XCONN TO CCP SUCTION HEADER	SHUT	MLB04
HV-8923A	SI PMP-A SUCT ISO VLV	OPEN	MLB01
HV-8806	RWST TO SI PUMPS	OPEN	MLB04
HV-8923B	SI PMP-B SUCT ISO VLV	OPEN	MLB02
HV-8814	SI PMP-A MINIFLOW ISO VLV	OPEN	MLB03
HV-8920	SI PMP-B MINIFLOW ISO VLV	OPEN	MLB03
HV-8821A	SI PMP-A TO COLD LEG ISO VLV	OPEN	MLB11
HV-8835	CL INJ FROM SIS	OPEN	MLB11
HV-8821B	SI PMP-B TO COLD LEG ISO VLV	OPEN	MLB12
HV-8813	SIS PMPS COMMON MINIFLOW ISO VLV	OPEN	MLB04
HV-8802A	SI PMP-A TO HOT LEG 1&4 ISO	SHUT	MLB11
HV-8802B	SI PMP-B TO HOT LEG 2&3 ISO	SHUT	MLB12

END OF ATTACHMENT C

Sheet 1 of 2

ATTACHMENT D

VALVE LINEUP FOR RHR PUMP COLD LEG INJECTION

VALVE NUMBER	FUNCTION	POSITION	POSITION INDICATION
1204-U4-207	RWST SUPPLY TO ECCS	OPEN	LOCAL (RWST)
HV-606	RHR HX TRAIN A OUTLET	OPEN	MLB01
HV-618	RHR HX TRAIN A BYPASS	SHUT	FIC-0618A
HV-607	RHR HX TRAIN B OUTLET	OPEN	MLB02
HV-619	RHR HX TRAIN B BYPASS	SHUT	FIC-0619A
HV-8804A	RHR PMP-A DISCH TO CHG PMPS SUCT	SHUT	MLB03
HV-8716B	RHR TRAIN B TO HOT LEG CROSSOVER ISO	OPEN	MLB04
HV-8811A	CNMT SUMP TO RHR PMP-A SUCTION	SHUT	MLB03
HV-8811B	CNMT SUMP TO RHR PMP-B SUCTION	SHUT	MLB04
HV-8812A	RWST TO RHR PMP-A SUCTION	OPEN	MLB03
HV-8701A	RHR PMP-A DOWNSTREAM SUCTION FROM HOT LEG LOOP 1	SHUT	HS-8701A
HV-8812B	RWST TO RHR PMP-B SUCTION	OPEN	MLB04
HV-8702A	RHR PMP-B DOWNSTREAM SUCTION FROM HOT LEG LOOP 4	SHUT	HS-8702A
HV-8701B	RHR PMP-A UPSTREAM SUCTION FROM HOT LEG LOOP 1	SHUT	HS-8701B
HV-8702B	RHR PMP-B UPSTREAM SUCTION FROM HOT LEG LOOP 4	SHUT	HS-8702B
HV-8809A	RHR PMP-A TO COLD LEG 1&2 ISO VLV	OPEN	MLB11

Sheet 2 of 2

ATTACHMENT D (Cont'd)

VALVE LINEUP FOR RHR PUMP COLD LEG INJECTION

VALVE NUMBER	FUNCTION	POSITION	POSITION INDICATION
HV-8716A	RHR TRAIN A TO HOT LEG CROSSOVER ISO	OPEN	MLB03
HV-8840	RHR TO HL ISO VLV	SHUT	MLB12
HV-8804B	RHR TO SI PMP-B ISO VLV	SHUT	MLB04
HV-8809B	RHR PMP-B TO COLD LEG 3&4 ISO VLV	OPEN	MLB12

END OF ATTACHMENT D

Sheet 1 of 2

ATTACHMENT E

POSSIBLE SOURCES OF ABNORMAL PRT CONDITIONS

RELIEF PATH TO PRT	INDICATION OF RELIEF PATH TO PRT	RELIEF PATH	COMPUTER POINT
PRZR PORV	• Abnormal high tailpipe temperature.	PV-455A PV-456A	- T6262
	• Valves not closed.	PV-455A HV-8000A	ZD8548 ZD8542
		PV-456A HV-8000B	ZD8546 ZD8544
PRZR SAFETY	• Abnormal high tailpipe temperature.	PSV-8010A PSV-8010B PSV-8010C	T6263 T6264 T6265
	• Valve not closed.	PSV-8010A PSV-8010B PSV-8010C	ZD9263 ZD9265 ZD9267
RCP NO. 1 SEAL LEAKOFF RELIEF	• Fluctuations in RCP no. 1 seal leakoff flow.	PSV-8121	-
	• Fluctuations in RCP no. 1 seal differential pressure.	PSV-8121	-
	• Excess letdown pressure greater than 150 psig with excess letdown aligned to VCT.	PSV-8121	-
REACTOR VESSEL HEAD VENT	• Indication of head vent flow with reactor head vent isolated from excess letdown.	HV-442A HV-442B	F9269 F9270
	• Reactor head vent to PRT throttle and isolation valves for a train - OPEN.	HV-8095A HV-8096A	ZD9298 ZD9302
		HV-442A	H0442
		HV-8095B HV-8096B	ZD9300 ZD9302
		HV-442B	H0443

Sheet 2 of 2

ATTACHMENT E (Cont'd)

POSSIBLE SOURCES OF ABNORMAL PRT CONDITIONS

RELIEF PATH TO PRT	INDICATION OF RELIEF PATH TO PRT	RELIEF PATH	COMPUTER POINT
LETDOWN LINE RELIEF	• Abnormal high temperature on TI-0125	PSV-8117	-
	• Letdown orifice isolation valves - OPEN.	PSV-8117	-
RHR PUMP SUCTION RELIEF	• RHR PUMP DISCHARGE HI PRESS annunciation.	PSV-8708A PSV-8708B	- -
	• RHR pump discharge pressure greater than 600 psig.	PSV-8708A PSV-8708B	- -
	• RCS pressure greater than 450 psig with RHR suction aligned to RCS hot legs.	PSV-8708A PSV-8708B	P0408 P0418 P0428 P0438

END OF ATTACHMENT E

FOLDOUT PAGE

1. RCP TRIP CRITERIA

   Trip all RCPs if BOTH conditions listed below occur:

   a. CCPs or SI pumps - AT LEAST ONE RUNNING.

   b. RCP Trip Parameter - RCS PRESSURE LESS THAN 1375 PSIG.

2. SI ACTUATION CRITERIA

   Actuate SI and return to Step 1 if EITHER conditions listed below occurs:

   - RCS subcooling - LESS THAN 24°F [38°F ADVERSE].
   - PRZR level - CANNOT BE MAINTAINED GREATER THAN 9% [36% ADVERSE].

3. RED PATH SUMMARY

   a. SUBCRITICALITY - Nuclear power greater than 5%.

   b. CORE COOLING - Core exit TCs greater than 1200°F.

      -OR-

      Core exit TCs greater than 711°F AND RVLIS full range less than 39% with no RCPs running.

   c. HEAT SINK - NR level in all SGs less than 10% [32% ADVERSE]

      AND total available feed flow less than 570 gpm.

   d. INTEGRITY - Cold leg temperature lowers more than 100°F in last 60 minutes AND WR RCS cold leg temperature less than 260°F.

   e. CONTAINMENT - Containment pressure greater than 52 psig.

4. AFW SUPPLY SWITCHOVER CRITERION
   Switch to alternate CST by initiating 13610, AUXILIARY FEEDWATER SYSTEM when CST level lowers to less than 15%.

EMERGENCY OPERATING PROCEDURE

E-2 FAULTED STEAM GENERATOR ISOLATION

PURPOSE

PRB REVIEW REQUIRED

This procedure provides actions to identify and isolate a faulted steam generator.

ENTRY CONDITIONS

- 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION, Step 23.
- 19005-C, ES-0.0 REDIAGNOSIS, Steps 1 and 2.
- 19010-C, E-1 LOSS OF REACTOR OR SECONDARY COOLANT, Step 2.
- 19030-C, E-3 STEAM GENERATOR TUBE RUPTURE, Step 6.
- 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT-SUBCOOLED RECOVERY DESIRED, Step 9.
- 19132-C, ECA-3.2 SGTR WITH LOSS OF REACTOR COOLANT-SATURATED RECOVERY DESIRED, Step 4.
- 19235-C, FR-H.5 RESPONSE TO STEAM GENERATOR LOW LEVEL, Step 3.
- Other procedures whenever an unisolated, faulted SG is identified.

ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

CAUTION:
- Foldout page should be continuously monitored and applicable actions taken.
- At least one SG should be maintained available for RCS cooldown.
- Any faulted SG or secondary break should remain isolated during subsequent recovery actions unless needed for RCS cooldown.

NOTE:
- Critical Safety Function Status Tree monitoring should be initiated at this time.
- 91001-C, EMERGENCY CLASSIFICATION AND IMPLEMENTING PROCEDURE should be implemented at this time.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 1. Check main steamline isolation and bypass valves - SHUT.	* 1. Shut valves as necessary.
2. Check SGs secondary pressure boundaries:	
a. Check pressures in all SGs - ANY STABLE OR RISING.	a. IF all SG pressures are lowering in an uncontrolled manner, THEN go to 19121-C, ECA-2.1 UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. Identify faulted SG(s):	3. Dispatch operator(s) to search for break location:
a. Check pressure in all SGs -	• Main steamlines. • Main feedlines. • Auxiliary feedlines. • Blowdown lines. • Sample lines. • Steam dump valves.
• ANY SG PRESSURE LOWERING IN AN UNCONTROLLED MANNER. -OR- • ANY SG COMPLETELY DEPRESSURIZED.	Isolate break if required. Go to Step 5.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION: If the TDAFW pump is the only available source of feed flow, steam supply to TDAFW pump should be maintained from at least one SG.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 4. Isolate faulted SG(s): • Isolate main feedlines: a. Shut MFIVs as necessary. • HV-5227 (SG 1) • HV-5228 (SG 2) • HV-5229 (SG 3) • HV-5230 (SG 4) b. Shut BFIVs as necessary. • HV-15196 (SG 1) • HV-15197 (SG 2) • HV-15198 (SG 3) • HV-15199 (SG 4)	* 4. Shut valves. IF valves can NOT be shut, THEN dispatch operator to locally isolate faulted SGs.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
(Step 4 continued from previous page)	
• Isolate AFW flow:	
a. Shut MDAFW pump throttle valves as necessary. • HV-5139 - SG 1 FROM MDAFW PMP-1 • HV-5132 - SG 2 FROM MDAFW PMP-B • HV-5134 - SG 3 FROM MDAFW PMP-B • HV-5137 - SG 4 FROM MDAFW PMP-A	
b. Shut TDAFW pump throttle valves as necessary. • HV-5122 - SG 1 FROM TDAFW • HV-5125 - SG 2 FROM TDAFW • HV-5127 - SG 3 FROM TDAFW • HV-5120 - SG 4 FROM TDAFW	b. Shut TDAFW pump steam supply valves: 1) Check TDAFW <u>NOT</u> only available source of feed flow to at least one SG. 2) <u>IF</u> not the only source of feed flow to at least one SG, <u>THEN</u> shut TDAFW pump steam supply valves: • HV-3009 (SG 1) LP-1 MS SPLY TO AUX FW TD PMP-1 • HV-3019 (SG 2) LP-2 MS SPLY TO AUX FW TD PMP-1
• Shut TDAFW pump steam supply valves as necessary: • HV-3009 (SG 1) LP-1 MS SPLY TO AUX FW TD PMP-1 • HV-3019 (SG 2) LP-2 MS SPLY TO AUX FW TD PMP-1	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
(Step 4 continued from previous page)	
• Verify SG ARVs - SHUT: • PV-3000 (SG 1) • PV-3010 (SG 2) • PV-3020 (SG 3) • PV-3030 (SG 4)	• IF SG ARV(s) can NOT be shut, THEN locally UNLOCK and shut associated SG ARV INLET isolation valve: UNIT 1 1-1301-U4-001 SG-1 1-1301-U4-002 SG-2 1-1301-U4-003 SG-3 1-1301-U4-004 SG-4 UNIT 2 2-1301-U4-001 SG-1 2-1301-U4-002 SG-2 2-1301-U4-003 SG-3 2-1301-U4-004 SG-4
• Verify BLOWDOWN ISOLATION valves - SHUT: • HV-7603A (SG 1) • HV-7603B (SG 2) • HV-7603C (SG 3) • HV-7603D (SG 4)	
• Verify BLOWDOWN SAMPLE ORC VALVE - SHUT: • HV-9451 SG-1 • HV-9452 SG-2 • HV-9453 SG-3 • HV-9454 SG-4	
5. Check operating CST level - GREATER THAN 15%.	5. Switch AFW suction to standby CST by initiating 13610, AUXILIARY FEEDWATER SYSTEM.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION: The steam generator sample valves should be opened one at a time and shut prior to opening another sample valve.

NOTE: Progress through EOP steps should not be delayed while waiting for steam generator sample results.

* 6. Check secondary radiation:

a. Open SG sample valves as required and direct chemistry to take periodic activity samples of all SGs:

SG	SAMPLE VALVE
• 1	HV-9451
• 2	HV-9452
• 3	HV-9453
• 4	HV-9454

b. Secondary radiation - NORMAL.

b. Go to 19030-C, E-3 STEAM GENERATOR TUBE RUPTURE.

1) MAIN STM LINE MONITORS

- RE-13120 (SG 1)
- RE-13121 (SG 2)
- RE-13122 (SG 3)
- RE-13119 (SG 4)

2) CNDSR AIR EJCTR/STM RAD MONITOR RE-12839C.

3) STM GEN LIQ PROCESS RAD:

- RE-0019 (Sample)
- RE-0021 (Blowdown)

4) SG sample radiation.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. Go to 19010-C, E-1 LOSS OF REACTOR OR SECONDARY COOLANT.	

END OF PROCEDURE TEXT

Sheet 1 of 1

ATTACHMENT A

RE-ESTABLISHING CCP COLD LEG INJECTION

1. Open RWST TO CCP A&B SUCTION valves:
   - LV-0112D
   - LV-0112E
2. Shut VCT OUTLET ISOLATION valves:
   - LV-0112B
   - LV-0112C
3. Open CCP alternate miniflow valves:

   TRAIN A:
   - HV-8508A - ENABLE PTL
   - HV-8509B - OPEN

   TRAIN B:
   - HV-8508B - ENABLE PTL
   - HV-8509A - OPEN
4. Shut CCP normal miniflow isolation valves:
   - HV-8111A - CCP-A MINIFLOW
   - HV-8111B - CCP-B MINIFLOW
   - HV-8110 - CCP-A&B COMMON MINIFLOW
5. Shut CHARGING TO RCS ISOLATION valves:
   - HV-8105
   - HV-8106
6. Open BIT DISCH ISOLATION valves:
   - HV-8801A
   - HV-8801B

END OF ATTACHMENT A

FOLDOUT PAGE

1. SI REINITIATION CRITERIA

Operate ECCS pumps as necessary if EITHER condition listed below occurs. Refer to ATTACHMENT A if necessary to re-establish CCP Cold Leg Injection.

- RCS subcooling - LESS THAN 24°F [38°F ADVERSE].
- PRZR level - CANNOT BE MAINTAINED GREATER THAN 9% [36% ADVERSE].

2. RED PATH SUMMARY

a. SUBCRITICALITY - Nuclear power greater than 5%.

b. CORE COOLING - Core exit TCs greater than 1200°F.

-OR-

Core exit TCs greater than 711°F AND RVLIS full range less than 39% with no RCPs running.

c. HEAT SINK - NR level in all SGs less than 10% [32% ADVERSE],

AND total available feed flow less than 570 gpm.

d. INTEGRITY - Cold leg temperature lowers more than 100°F in last 60 minutes AND RCS WR cold leg temperature less than 260°F.

e. CONTAINMENT - Containment pressure greater than 52 psig.

EMERGENCY OPERATING PROCEDURE

E-3 STEAM GENERATOR TUBE RUPTURE

PURPOSE

PRB REVIEW REQUIRED

This procedure provides actions to terminate leakage of reactor coolant into the secondary system following a steam generator tube rupture. (Applicable in Modes 1, 2, and 3.)

ENTRY CONDITIONS

- 19000-C, E-0 REACTOR TRIP OR SAFETY INJECTION, Steps 25, 29, and 33.
- 19005-C, ES-0.0 REDIAGNOSIS, Step 3.
- 19010-C, E-1 LOSS OF REACTOR OR SECONDARY COOLANT, Steps 4, 5, and 16, and the Foldout Page.
- 19012-C, ES-1.2 POST-LOCA COOLDOWN AND DEPRESSURIZATION, Step 6.
- 19020-C, E-2 FAULTED STEAM GENERATOR ISOLATION, Step 6.
- 19031-C, ES-3.1 POST-SGTR COOLDOWN USING BACKFILL, Step 4 and the Foldout Page.
- 19033-C, ES-3.3 POST-SGTR COOLDOWN USING STEAM DUMP, Step 4 and the Foldout Page.
- 19121-C, ECA-2.1 UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS, Step 6.
- 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT-SUBCOOLED RECOVERY DESIRED, Step 10.
- 19132-C, ECA-3.2 SGTR WITH LOSS OF REACTOR COOLANT-SATURATED RECOVERY DESIRED, Step 5.
- 19133-C, ECA-3.3 SGTR WITHOUT PRESSURIZER PRESSURE CONTROL, Steps 2, 3, 4, and 5.
- 19233-C, FR-H.3 RESPONSE TO STEAM GENERATOR HIGH LEVEL, Step 8.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE:

- Foldout page should be continuously monitored and applicable action taken.
- Critical Safety Function Status Tree monitoring should be initiated at this time.
- Chemistry personnel should be available for sampling during this procedure.
- Seal injection flow should be maintained to all RCPs.
- 91001-C, EMERGENCY CLASSIFICATION AND IMPLEMENTING PROCEDURE should be implemented at this time.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 1. Check if RCPs should be stopped:	
a. ECCS pumps - AT LEAST ONE RUNNING: • CCP or SI pump	a. Go to Step 2.
b. RCP trip parameter - RCS PRESSURE LESS THAN 1375 PSIG.	b. <u>WHEN</u> RCS pressure lowers to less than 1375 psig prior to initiation of RCS cooldown in Step 14, <u>THEN</u> stop all RCPs and return to step in affect. Continue with Step 2.
c. Stop all RCPs.	
* 2. Identify ruptured SG(s) by any of the following conditions: • Unexpected rise in any SG NR level. • High radiation from any SG sample. • High radiation from any SG steamline. • High radiation from any SG blowdown line.	* 2. <u>WHEN</u> ruptured SG(s) identified, <u>THEN</u> perform Steps 3 and 4. Continue with Steps 5 through 12.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

<u>CAUTION</u>:

- If the TDAFW pump is the only available source of feed flow, steam supply to the TDAFW pump should be maintained from at least one SG.
- At least one SG should be maintained available for RCS cooldown.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 3. Isolate flow from ruptured SG(s):	
a. Adjust ruptured SG ARV(s) controller setpoint to 1160 psig (pot setting 7.73).	
b. Check ruptured SG ARV(s) - SHUT. • PV-3000 SG-1 • PV-3010 SG-2 • PV-3020 SG-3 • PV-3030 SG-4	b. <u>WHEN</u> ruptured SG(s) pressure less than 1160 psig, <u>THEN</u> verify SG ARV shut. <u>IF</u> the SG ARV is <u>NOT</u> shut, <u>THEN</u> place SG ARV controller in MANUAL and shut SG ARV. <u>IF</u> SG ARV can <u>NOT</u> be shut, <u>THEN</u> locally isolate SG ARV.
c. Shut steam supply valves from the ruptured SG(s) to the TDAFW pump: • HV-3009 (SG 1) - LP-1 MS SPLY TO AUX FW TD PMP-1 • HV-3019 (SG 2) - LP-2 MS SPLY TO AUX FW TD PMP-1	c. Locally isolate the TDAFW pump steam supply from ruptured SG(s).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
(Step 3 continued from previous page)	
d. Verify BLOWDOWN ISOLATION valves from all SGs - SHUT WITH HANDSWITCH IN CLOSE: • HV-7603A SG 1 • HV-7603B SG 2 • HV-7603C SG 3 • HV-7603D SG 4	d. Shut valves.

e. Shut ruptured SG(s) main steamline isolation and bypass valves.	e. Perform the following:
	1) Shut all remaining main steam line isolation and bypass valves.
	2) Verify the following valves are shut:
	• Steam dump valves:
	  • Status lightboard ZLB-2 indicates all steam dump valves shut.
	• AUX AND MAIN STEAM SPARGERS valve:
	  • HV-6194A
	• Steam jet air ejector valves:
	  • HV-4084B - SJAE-1 MN & AUX STM SPLY VLV
	  • HV-4085B - SJAE-2 MN & AUX STM SPLY VLV

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

(Step 3 continued from previous page)

- MSR steam supply:
  - HS-6030 - MSR A&C REHEAT STEAM SOURCE STOP VALVES
  - HS-6015 - MSR B&D REHEAT STEAM SOURC STOP VALVES

3) Use intact SG ARV(s) for steam dump.
   IF at least one intact SG can NOT be isolated from any ruptured SG,
   THEN go to 19131-C ECA-3.1, SGTR With Loss Of Reactor Coolant - Subcooled Recovery Desired

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION:

- This procedure should be performed in a timely manner to assure that break flow to the ruptured SG(s) is terminated before water enters the SGs main steam pipe.
- If any ruptured SG is also faulted, feed flow to that SG should remain isolated during subsequent recovery actions unless needed for RCS cooldown.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 4. Check ruptured SG(s) level:	
a. NR level - GREATER THAN 10% [32% ADVERSE].	a. Maintain feed flow to ruptured SG(s). WHEN ruptured SG(s) level greater than 10% [32% ADVERSE], THEN stop feed flow to ruptured SG(s). Continue with Step 5. OBSERVE CAUTION PRIOR TO STEP 5.
b. Stop feed flow to ruptured SG(s).	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION: If any PRZR PORV opens because of high PRZR pressure, Step 5b should be repeated after pressure lowers to less than 2315 psig.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 5. Check PRZR PORVS and block valves:	
a. Power to PRZR PORV block valves - AVAILABLE.	a. Restore power to block valves.
b. PRZR PORVs - SHUT.	b. IF PRZR pressure less than 2315 psig, THEN shut PRZR PORVs. IF any PRZR PORV can NOT be shut, THEN shut its block valve. IF block valve can NOT be shut, THEN go to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.

NOTE: COPS may be disarmed when temperature rises to greater than 350 °F and has remained greater than 290°F (green integrity CSFST).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
c. PRZR PORV Block valves - AT LEAST ONE OPEN.	c. IF NOT shut to isolate an excessively leaking or open PRZR PORV, AND WHEN PRZR pressure is greater than 2185 psig, THEN open at least one PRZR PORV block valve. WHEN RCS WR CL temperatures less than 350°F, THEN arm COPs.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. Check SGs secondary pressure boundaries:	
a. Check pressures in all SGs - • NO SG PRESSURE LOWERING IN AN UNCONTROLLED MANNER. • NO SG COMPLETELY DEPRESSURIZED.	a. Ensure all faulted SGs isolated if not needed for RCS cooldown: • Steamlines • Feedlines <u>IF</u> all faulted SGs <u>NOT</u> isolated, <u>THEN</u> go to 19020-C, E-2 FAULTED STEAM GENERATOR ISOLATION.

<u>CAUTION</u>:

- Switching to alternate CST by initiating 13610, AUXILIARY FEEDWATER SYSTEM will be necessary when CST level lowers to less than 15%.
- AFW flow to intact SGs should be controlled in anticipation of RCS cooldown in Step 14 in order to prevent reinitiation of AFW flow to ruptured SG.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 7. Check intact SG(s) levels:	
a. Check NR level - GREATER THAN 10% [32% ADVERSE].	a. <u>IF</u> all SGs NR levels less than 10% [32% ADVERSE], <u>THEN</u> maintain total feed flow greater than 570 gpm.
b. Control feed flow to maintain NR level between 10% [32% ADVERSE] and 65%.	b. <u>IF</u> NR level in any intact SG continues to rise in an uncontrolled manner, <u>THEN</u> return to Step 1.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION: If offsite power is lost after SI reset, action is required to restart the following ESF equipment if plant conditions require their operation:

- RHR pumps
- SI pumps
- Post-LOCA cavity purge fans
- Containment Coolers in low speed (started in high speed on a UV signal)
- ESF Chilled Water Pumps (if CRI has been reset)

8. Reset SI.

CAUTION: Repositioning Phase A isolation valves may cause radiation problems throughout the plant.

9. Reset containment isolation Phase A.

10. Establish instrument air to containment:

    a. Verify instrument air pressure - GREATER THAN 100 PSIG.

    Response not obtained: a. Start additional air compressors to establish instrument air pressure greater than 100 psig by initiating 13710, SERVICE AIR SYSTEM.

    b. Open INSTR AIR CNMT ISO VLV HV-9378 using handswitches HS-9378A and HS-9378B.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*11. Verify all AC busses - ENERGIZED BY OFFSITE POWER: a. Emergency busses - ENERGIZED BY OFFSITE POWER.	*11. Perform the following: a. Verify both diesel generators have assumed the following train related loads: • 2 NSCW pumps • 2 CCW pumps • 1 CCP • 1 ACCW pump • 1 MDAFW pump • 4 containment coolers • 480V AC Switchgear: UNIT 1 TRAIN A: • 1AB04 • 1AB05 • 1AB15 • 1NB01 TRAIN B: • 1BB06 • 1BB07 • 1BB16 • 1NB10 UNIT 2 TRAIN A: • 2AB04 • 2AB05 • 2AB15 • 2NB01 TRAIN B: • 2BB06 • 2BB07 • 2BB16 • 2NB10 IF two ACCW pumps started THEN stop one ACCW pump. WHEN offsite power available, THEN restore offsite power by initiating 13427, 4160V AC 1E ELECTRICAL DISTRIBUTION.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

(Step 11 continued from previous page)

b. Other AC busses - ENERGIZED BY OFFSITE POWER:

UNIT 1	UNIT 2
• 1NA01	• 2NA01
• 1NA04	• 2NA04
• 1NA05	• 2NA05
• 1NB03	• 2NB03
• 1NB11	• 2NB11
• 1NB19	• 2NB19
• 1NB12	• 2NB01
• 1NB01	• 2NB10
• 1NB10	

RESPONSE NOT OBTAINED:

b. Energize AC busses by initiating the appropriate procedure:

UNIT 1	PROCEDURE
• 1NA01	13425-1
• 1NA04	13425-1
• 1NA05	13425-1
• 1NB03	13430-1
• 1NB11	13430-1
• 1NB19	13430-1
• 1NB12	13430-1
• 1NB01	13430-1
• 1NB10	13430-1

UNIT 2	PROCEDURE
• 2NA01	13425-2
• 2NA04	13425-2
• 2NA05	13425-2
• 2NB03	13430-2
• 2NB11	13430-2
• 2NB19	13430-2
• 2NB01	13430-2
• 2NB10	13430-2

CAUTION: RCS pressure should be monitored. If RCS pressure lowers to less than 300 psig the RHR pumps should be restarted to supply water to the RCS.

*12. Check if RHR pumps should be stopped:

a. RCS pressure - GREATER THAN 300 PSIG.

RESPONSE NOT OBTAINED: a. Go to Step 13. OBSERVE CAUTION PRIOR TO STEP 13.

b. Stop RHR pumps.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION: Isolation of the ruptured SG(s) should be complete before continuing to step 13 unless a ruptured SG is needed for RCS cooldown.

13. Check ruptured SG(s) pressure - GREATER THAN 290 PSIG.	13. Go to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.

ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

CAUTION: AFW flow to intact SG(s) should be raised prior to maximum rate depressurization, to prevent re-initiation of AFW flow to ruptured SG.

NOTE:

- Low steamline pressure SI/SLI should be blocked when PRZR pressure lowers to less than 2000 psig and high steam pressure rate alarms are clear.
- When the low steamline pressure SI signal is blocked, main steamline isolation will occur if the high steam pressure rate setpoint is exceeded.
- To prevent an undesired automatic steam dump isolation during RCS cooldown, the steam dump interlock handswitches may be placed in BYPASS INTERLOCK as RCS temperature approaches 550 °F.

*14. Initiate RCS cooldown:

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

(Step 14 continued from previous page)

a. Determine required core exit temperature:

Lowest Ruptured SG Pressure (Psig)	Core Exit Temperature (°F)	
	Normal	Adverse
1200	530	514
1100	518	503
1000	506	491
900	493	478
800	479	464
700	463	449
600	445	431
500	424	411
400	399	387
300	366	356
290	350	350

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

(Step 14 continued from previous page)

NOTE: If using steam dumps, the maximum rate cooldown should be established without delay but in a controlled manner to prevent initiation of a SLI.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
b. Dump steam to condenser from intact SG(s) at maximum rate using steam dumps.	b. Dump steam at maximum rate from intact SG ARV(s). IF no intact SG is available, THEN perform the following: • Use faulted SG. -OR- • Go to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.
c. Core exit TCs - LESS THAN REQUIRED TEMPERATURE.	c. Return to step 14b.
d. Stop RCS cooldown.	
e. Control steam release to maintain core exit TC temperatures - LESS THAN REQUIRED TEMPERATURE.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION:
- RCS cooldown in step 14 should be completed before continuing to Step 15.
- Lowering ruptured SG pressure and subcooling may have occurred during the rapid RCS cooldown; however, ruptured SG pressure and subcooling should begin to rise as RCS pressure recovers after the cooldown is stopped.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15. Check ruptured SG(s) pressure - STABLE OR RISING.	15. IF ruptured SG(s) pressure continues to lower to less than 250 psig above intact SG(s) used for cooldown, THEN go to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.
16. Check RCS subcooling - GREATER THAN 44°F [58°F ADVERSE].	16. Go to 19131-C, ECA-3.1 SGTR WITH LOSS OF REACTOR COOLANT: SUBCOOLED RECOVERY DESIRED.

Facility: Date of Exam: Exam Level:

Tier	Group	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G*	Point Total
1. Emergency & Abnormal Plant Evolutions	1	2	2	5				2	4			1	16
	2	3	2	2				3	5			2	17
	3	1	1	0				1	0			0	3
	Tier Totals	6	5	7				6	9			3	36
2. Plant Systems	1	3	2	2	5	2	0	2	3	2	1	1	23
	2	1	0	2	0	2	2	1	5	0	5	2	20
	3	0	0	1	2	0	1	1	2	0	0	1	8
	Tier Totals	4	2	5	7	4	3	4	10	2	6	4	51

3. Generic Knowledge and Abilities	Cat 1	Cat 2	Cat 3	Cat 4	
	3	4	3	3	13

Note: 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.

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000005 Inoperable/Stuck Control Rod / 1	x						005AK1.02	3.1/3.9	1
000015/17 RCP Malfunctions / 4				x			015AA1.23	3.1/3.2	1
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4					x		WE09EA2.1	3.1/3.8	1
000024 Emergency Boration / 1			x				024AK3.02	4.2/4.4	1
000026 Loss of Component Cooling Water / 8			x				026AK3.03	4.0/4.2	1
000027 Pressurizer Pressure Control System Malfunction / 3						x	027AG2.1.7	3.7/4.4	1
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4				x			040EA1.18	4.2/4.2	1
CE/A11; W/E08 RCS Overcooling - PTS / 4	x						WE08EK1.1	3.5/3.8	1
000051 Loss of Condenser Vacuum / 4					x		051AA2.02	3.9/4.1	1
000055 Station Blackout / 6			x				055EK3.02	3.1/3.1	1
000057 Loss of Vital AC Elec. Inst. Bus / 6					x		057AA2.18	3.1/3.1	1
000062 Loss of Nuclear Service Water / 4			x				062AK3.02	3.6/3.9	1
000067 Plant Fire On-site / 9									
000068 (BW/A06) Control Room Evac. / 8		x					068AK2.03	2.9/3.1	1
000069 (W/E14) Loss of CTMT Integrity / 5					x		069AA2.01	3.7/4.3	1
000074 (W/E06&E07) Inad. Core Cooling / 4		x					074EK2.1 replaced EA 1.01	3.6/3.8	1
BW/E03 Inadequate Subcooling Margin / 4									
000076 High Reactor Coolant Activity / 9			x				076AK3.05 replaces AK 2.01	2.9/3.6	1
BW/A02&A03 Loss of NNI-X/Y / 7									
K/A Category Totals:	2	2	5	2	4	1	Group Point Total:		16

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000001 Continuous Rod Withdrawal / 1					x		001AK2.06 replaces 2.1.33	3.0/3.1	1
000003 Dropped Control Rod / 1		x					003AK2.05	2.5/2.8	1
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1						x	007G2.4.49	4.0/4.0	1
BW/A01 Plant Runback / 1									
BW/A04 Turbine Trip / 4									
000008 Pressurizer Vapor Space Accident / 3				x			008AA1.07 RO only added ka	4.0/4.2	1
000009 Small Break LOCA / 3					x		009EA2.38 added KA	3.9/4.3	1
000011 Large Break LOCA / 3				x			011EA1.13 RO ONLY	4.1/4.2	1
W/E04 LOCA Outside Containment / 3			x				WE04EK3.3	3.8/3.8	1
BW/E08; W/E03 LOCA Cooldown/Depress. / 4		x					WE03EK2.2	3.7/4.0	1
W/E11 Loss of Emergency Coolant Recirc. / 4					x		WE11EA2.1	3.4/4.2	1
W/EO1 & E02 Rediagnosis & SI Termination / 3									
000022 Loss of Reactor Coolant Makeup / 2				x			022AA1.11	3.2/3.2	1
000025 Loss of RHR System / 4	x						025AK1.01	3.9/4.3	1
000029 Anticipated Transient w/o Scram / 1			x				029EK3.12	4.4/4.7	1
000032 Loss of Source Range NI / 7									
000033 Loss of Intermediate Range NI / 7	x						033AK1.01	2.7/3.0	1
000037 Steam Generator Tube Leak / 3					x		037AA2.11	3.8/3.8	1
000038 Steam Generator Tube Rupture / 3						x	038AG2.4.48	3.5/3.8	1
000054 (CE/E06) Loss of Main Feedwater / 4									
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4									
000058 Loss of DC Power / 6									
000059 Accidental Liquid RadWaste Rel. / 9									
000060 Accidental Gaseous Radwaste Rel. / 9									
000061 ARM System Alarms / 7					x		061AA2.05	2.5/3.1	1
W/E16 High Containment Radiation / 9	x						WE16EK1.3	3.0/3.3	1
CE/E09 Functional Recovery									
K/A Category Point Totals:	3	2	2	3	5	2	Group Point Total:		17

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000028 Pressurizer Level Malfunction / 2									
000036 (BW/A08) Fuel Handling Accident / 8	x						036AK1.01	3.5/4.1	1
000056 Loss of Off-site Power / 6				x			056AA1.10	4.3/4.3	1
000065 Loss of Instrument Air / 8									
BW/E13&E14 EOP Rules and Enclosures									
BW/A05 Emergency Diesel Actuation / 6									
BW/A07 Flooding / 8									
CE/A16 Excess RCS Leakage / 2									
W/E13 Steam Generator Over-pressure / 4		x					WE13 EK 2.1	3.0/3.1	1
W/E15 Containment Flooding / 5									
K/A Category Point Totals:	1	1	0	1	0	0	Group Point Total:		3

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
001 Control Rod Drive									x			001A3.04 RO 36	3.5/3.8	1
003 Reactor Coolant Pump		x					x					003A1.09 003K2.01	3.0/3.0 3.1/3.1	2
004 Chemical and Volume Control	x						x	x				004A1.03 replaces K 5.19 004A2.12 004K1.14 added RO only	3.8/3.8 4.1/4.3 2.6/2.8	3
013 Engineered Safety Features Actuation			x		x							013K3.01 013K5.02 RO only	4.4/4.7 2.9/3.3	2
015 Nuclear Instrumentation		x									x	015G2.1.11 015K2.01 RO only	3.0/3.8 3.3/3.7	2
017 In-core Temperature Monitor				x								017K4.01	3.4/3.7	1
022 Containment Cooling				x					x			022A3.01 022K3.02 RO only	4.1/4.3 4.1/4.3	2
025 Ice Condenser														
056 Condensate	x											056K1.03	2.6/2.6	1
059 Main Feedwater			x	x								059K3.03 059K4.19 added RO only	3.5/3.7 3.2/3.4	2
061 Auxiliary/Emergency Feedwater	x			x								061K1.01 061K4.08 replaced A 1.04	3.4/3.7 2.7/2.9	2
068 Liquid Radwaste					X							068K5.03	2.6/2.6	1
071 Waste Gas Disposal								x		x		071A2.02 071A4.13 RO only	3.3/3.6 3.0/3.1	2
072 Area Radiation Monitoring				x				x				072A2.01 072K4.01	2.7/2.9 3.3/3.6	2
K/A Category Point Totals:	3	2	2	5	2	0	2	2	3	1	1	Group Point Total:		23

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
002 Reactor Coolant					x							002K5.12 RO only	3.7/3.9	1
006 Emergency Core Cooling										x		006A4.07	4.4/4.4	1
010 Pressurizer Pressure Control										x		010A4.01	3.7/3.5	1
011 Pressurizer Level Control										x		011A4.05	3.2/2.9	1
012 Reactor Protection								x				012A2.01	3.1/3.6	1
014 Rod Position Indication					x							014K5.01	2.7/3.0	1
016 Non-nuclear Instrumentation								x				016A2.03	3.0/3.3	1
026 Containment Spray			x									026K3.01	3.9/4.1	1
029 Containment Purge														
033 Spent Fuel Pool Cooling								x				033A2.03 RO only	3.1/3.5	1
035 Steam Generator						x						035K6.03	3.4/3.9	1
039 Main and Reheat Steam								x				039A2.04	3.4/3.7	1
055 Condenser Air Removal			x									055K3.01 RO only	2.5/2.7	1
062 AC Electrical Distribution										x		062A4.01	3.3/3.1	1
063 DC Electrical Distribution							x					063A1.01replaced G 2.1.24	2.5/3.3	1
064 Emergency Diesel Generator						x						064K6.08	3.2/3.3	1
073 Process Radiation Monitoring	x											073K1.01 replaced A 2.02	3.6/3.9	1
075 Circulating Water								x			x	075A2.02 075G2.1.32 added	2.5/2.7 3.5/3.8	2
079 Station Air										x		079A.401	2.7/2.7	1
086 Fire Protection											x	086G2.4.27	2.7/3.2	1
K/A Category Point Totals:	1	0	2	0	2	2	1	5	0	5	2	Group Point Total:		20

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						x						005K6.03	2.5/2.6	1
007 Pressurizer Relief/Quench Tank			x									007K3.01	3.3/3.6	1
008 Component Cooling Water								x				008A2.02	3.2/3.5	1
027 Containment Iodine Removal														
028 Hydrogen Recombiner and Purge Control								x				028A2.02 RO only	3.5/3.9	1
034 Fuel Handling Equipment							x					034A1.02 replaced A 2.02	2.9/3.7	1
041 Steam Dump/Turbine Bypass Control														
045 Main Turbine Generator				x								045K4.11	3.6/3.9	1
076 Service Water														
078 Instrument Air				x								078K4.02 added KA RO only	3.2/3.5	1
103 Containment											x	103G2.1.28 replaced G 2.1.12	3.2/3.3	1
K/A Category Point Totals:	0	0	1	2	0	1	1	2	0	0	1	Group Point Total:		8

Plant-Specific Priorities

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

Facility: Vogtle Date of Exam: 12/20/99 Exam Level: RO

Category	K/A #	Topic	Imp.	Points
Conduct of Operations	2.1.	G2.1.20 both	4.3/4.2	1
	2.1.	G2.1.3 RO only	3.0/3.4	1
	2.1.	G2.1.33 RO only	3.4/4.0	1
	2.1.			
	2.1.			
	2.1.			
	Total			3
Equipment Control	2.2.	G2.1.8 RO only	3.8/3.6	1
	2.2.	G2.2.1 both	3.7/3.6	1
	2.2.	G2.2.13 both	3.6/3.8	1
	2.2.	G2.2.30	3.5/3.3	1
	2.2.			
	2.2.			4
	Total			
Radiation Control	2.3.	G2.3.10	2.9/3.3	2
	2.3.	G2.3.4 RO only	2.5/3.1	1
	2.3.			
	2.3.			
	2.3.			
	2.3.			
	Total			3
Emergency Procedures/ Plan	2.4.	G2.4.1 RO only	4.3/4.6	1
	2.4.	G2.4.10 both	3.0/3.1	1
	2.4.	G2.4.21 both	3.7/4.3	1
	2.4.			
	2.4.			
	2.4.			
	Total			3
Tier 3 Point Total (RO)				13

Facility:	Date of Exam:	Exam Level:										
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	3	4	7				2	6			2	24
	2	4	1	2				1	6			2	16
	3	1	1	0				1	0			0	3
	Tier Totals	8	6	9				4	12			4	43
2. Plant Systems	1	2	1	3	3	1	0	4	1	2	0	2	19
	2	1	0	0	0	0	2	1	5	0	5	3	17
	3	0	0	1	1	0	1	0	1	0	0	0	4
	Tier Totals	3	1	4	4	1	3	5	7	2	5	5	40
3. Generic Knowledge and Abilities				Cat 1		Cat 2		Cat 3		Cat 4		17
				5		4		3		5		

Note:
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.

Emergency and Abnormal Plant Evolutions - Tier 1/Group 1

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000001 Continuous Rod Withdrawal / 1		x					AK 2.06 Replaced 2.1.33		1
000003 Dropped Control Rod / 1		x					AK 2.05 Control Rod Pwr supplies and logic Circuits	2.5/2.8	1
000005 Inoperable/Stuck Control Rod / 1	x						AK 1.02 Flux Tilt	3.1/3.9	1
000011 Large Break LOCA / 3					x		EA 2.11 Ability to Det/Int conditions for throttling HPI SRO only	3.9/4.3	1
W/E04 LOCA Outside Containment / 3			x				EK 3.3 Manipulatión of controls to obtain desired outcome.	3.8/3.8	1
W/EO1 & E02 Rediagnosis & SI Termination / 3									
000015/17 RCP Malfunctions / 4				x			AA 1.23 RCP Vibration	3.1/3.2	1
BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4					xx		EA 2.2 Adherence to Appropriate Procedure SRO only WE09EA2.1	3.4/3.8 3.1/3.8	2
000024 Emergency Boration / 1			x				AK 3.02 Actions Contained in EOP	4.2/4.4	1
000026 Loss of Component Cooling Water / 8			x				AK 3.03 SRO 79'	4.0/4.2	1
000029 Anticipated Transient w/o Scram / 1			x				EK 3.12 RO 89'	4.4/4.7	1
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4	x			x			AA 1.18 Control Rod Pos Indicators WE12K1.2 SRO only	4.24.2 3.5/3.8	2
CE/A11; W/E08 RCS Overcooling - PTS / 4	x						WE08EK1.1 Comp, Cap, function of emergency system.	3.5/3.8	1
000051 Loss of Condenser Vacuum / 4					x		AA 2.02 SRO 69	3.9/4.1	1
000055 Station Blackout / 6			x			x	G 2.1.20 SRO only EK 3.02	4.3/4.2 3.1/3.1	2
000057 Loss of Vital AC Elec. Inst. Bus / 6					x		AA 2.18 Ind, VLV, BKR, DMPR position on Loss of Power	3.1/3.1	1
000059 Accidental Liquid RadWaste Rel. / 9							Deleted.		
000062 Loss of Nuclear Service Water / 4			x				AK 3.02 Auto Actions on ESFAS	3.6/3.9	1
000067 Plant Fire On-site / 9						x	G 2.4.27 Knowledge of Fire in the Plant proc. SRO only	3.0/3.5	1
000068 (BW/A06) Control Room Evac. / 8		x					AK 2.03 Controllers and Positioners	2.9/3.1	1
000069 (W/E14) Loss of CTMT Integrity / 5					x		AA 2.01 Loss of Cont Integ	3.7/4.3	1
000074 (W/E06&E07) Inad. Core Cooling / 4		x					074EK2.1 replaces EA 1.01	3.6/3.8	1
BW/E03 Inadequate Subcooling Margin / 4									
000076 High Reactor Coolant Activity / 9			x				076AK3.05 replaces AK 2.01	2.9/3.6	1
BW/A02&A03 Loss of NNI-X/Y / 7									
K/A Category Totals:	3	4	7	2	6	2	Group Point Total:		24

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1						x	G 2.4.49 RO '3	4.0/4.0	1
BW/A01 Plant Runback / 1									
BW/A04 Turbine Trip / 4									
000008 Pressurizer Vapor Space Accident / 3	x						AK 1.01 Thermo of Leaking Valves SRO only	3.2/3.7	1
000009 Small Break LOCA / 3					x		EA 2.38 Added	3.9/4.3	1
BW/E08; W/E03 LOCA Cooldown - Depress. / 4		x					WE03EK2.2 Heat removal system	3.7/4.0	1
W/E11 Loss of Emergency Coolant Recirc. / 4					x		WE11EA2.2 Adherence to App procedures & OPS within limitations SRO	3.4/4.2	1
000022 Loss of Reactor Coolant Makeup / 2				x			AA 1.11 replaced AA 1.03	3.2/3.2	1
000025 Loss of RHR System / 4	x						K. 101 RO88	3.9/4.3	1
000027 Pressurizer Pressure Control System Malfunction / 3						x	G 2.1.7 replaced AK 3.03	3.7/4.4	1
000032 Loss of Source Range NI / 7			x				AK 3.01 Reason for Startup Termination on SR loss SRO only	3.2/3.6	1
000033 Loss of Intermediate Range NI / 7	x						AK 1.01 Effects on Voltage on Perf	2.7/3.0	1
000037 Steam Generator Tube Leak / 3					xx		AA 2.10 SRO 90 SRO only AA 2.11 BOTH added KA	3.2/4.1 3.8/3.8	2
000038 Steam Generator Tube Rupture / 3							Deleted.		
000054 (CE/E06) Loss of Main Feedwater / 4					x		AA 2.03 Conditions/Responses for AFW pump start SRO only	4.1/2.3	1
BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4									
000058 Loss of DC Power / 6			x				AK 3.01 Use of DC power by EDGS	3.4/3.7	1
000060 Accidental Gaseous Radwaste Rel. / 9							Deleted		
000061 ARM System Alarms / 7					x		AA 2.05 Need for Area Evacuation	3.5/4.2	1
W/E16 High Containment Radiation / 9	x						WE16EK1.3 Annunciators & conditions IND signals / Remedial actions	3.0/3.3	1
000065 Loss of Instrument Air / 8									
CE/E09 Functional Recovery									
K/A Category Point Totals:	4	1	2	1	6	2	Group Point Total:		16

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
000028 Pressurizer Level Malfunction / 2									
000036 (BW/A08) Fuel Handling Accident / 8	x						AK 1.01 Radiation Exposure Hazzards	3.5/4.1	1
000056 Loss of Off-site Power / 6				x			AA 1.10 MDAFWP	4.3/4.3	1
BW/E13&E14 EOP Rules and Enclosures									
BW/A05 Emergency Diesel Actuation / 6									
BW/A07 Flooding / 8									
CE/A16 Excess RCS Leakage / 2									
W/E13 Steam Generator Over-pressure / 4		x					WE13 EK 2.1 Comp and Functions of Control and Safety System I &C	3.0/3.1	1
W/E15 Containment Flooding / 5									
K/A Category Point Totals:							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									x			A 3.04 RO 36	3.5/3.8	1
003 Reactor Coolant Pump		x					x					A.109 RO 37, K2.01 Power Supply to RCPs	2.8/2.8 3.1/3.1	2
004 Chemical and Volume Control							xx					A1.03 A2.12	3.8/3.8 4.1/4.3	2
013 Engineered Safety Features Actuation			x								x	G2.1.20 SRO ONLY K 3.01 Fuel	4.3/4.3 4.4/4.7	2
014 Rod Position Indication					x							K 5.01 RO 42	2.7/3.0	1
015 Nuclear Instrumentation											x	G. 2.1.11, Knowledge of < 1 hour TA A/S	3.0/3.8	1
017 In-core Temperature Monitor				x								K4.01 Input to Subcooling Monitors	3.4/3.7	1
022 Containment Cooling									x			A 3.01 Initiation of Safeguards Mode	4.1/4.3	1
025 Ice Condenser														
026 Containment Spray			X									K 3.01 Cont Cooling System	39/4.1	1
056 Condensate	x											K 1.03 MFW	2.6/2.6	1
059 Main Feedwater			x									K 3.03 Sgs	3.5/3.7	1
061 Auxiliary/Emergency Feedwater	x			x								K 1.01 SRO 29 K 4.08 replaces A 1.04	3.4/3.7 2.7/2.9	2
063 DC Electrical Distribution							x					A 1.01 replaces G 2.1.24	2.5/3.3	1
068 Liquid Radwaste												Deleted.		
071 Waste Gas Disposal								x				A 2.02 SRO 93	3.3/3.6	1
072 Area Radiation Monitoring				x								K 4.01 Cont Vent Iso	3.3/3.6	1
K/A Category Point Totals:	2	1	3	3	1	0	4	1	2	0	2	Group Point Total:		19

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														
006 Emergency Core Cooling										x		A 4.07	4.4/4.4	1
010 Pressurizer Pressure Control										x		A 4.01 PZR spray vlv	3.7/3.5	1
011 Pressurizer Level Control										x		A 4.05 Letdown flow controller	3.2/2.9	1
012 Reactor Protection								x				A 2.01 Faulty Bistable Operation	3.1/3.6	1
016 Non-nuclear Instrumentation								x				A 2.03 Interruption of Xmt'd S/G	3.0/3.3	1
027 Containment Iodine Removal														
028 Hydrogen Recombiner and Purge Control														
029 Containment Purge												Deleted.		
033 Spent Fuel Pool Cooling								x				A 2.02 SRO 45 SRO only	2.7/3.0	1
034 Fuel Handling Equipment							x					A 1.02	3.4/3.9	1
035 Steam Generator						x						K 6.03 S/G Level Det	2.6/3.0	1
039 Main and Reheat Steam								x				A 2.04 Malfunctioning Steam Dumps	3.4/3.7	1
055 Condenser Air Removal												NA		
062 AC Electrical Distribution										x		A 4.01 Replaces K 2.01	3.3/3.1	1
064 Emergency Diesel Generator						x						K 6.08 Fuel oil Storage Tanks	3.2/3.3	1
073 Process Radiation Monitoring	x											K 1.01 replaces A 2.02 and K 5.02	3.6/3.9	1
075 Circulating Water								x			x	A 2.02 Loss of Circ Water Pumps 075G2.1.32 added	2.5/2.7 3.5/3.8	2
079 Station Air										x		079A.401 X tie with IA	2.7/2.7	1
086 Fire Protection											x	086G2.4.26 SRO only	2.9/3.3	1
103 Containment											x	103G2.1.28 replaces 2.1.12	3.2/3.3	1
K/A Category Point Totals:	1	0	0	0	0	2	1	5	0	5	3	Group Point Total:		17

ES-401

PWR SRO Examination Outline
Plant Systems - Tier 2/Group 3

Form ES-401-3

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
005 Residual Heat Removal						x						K 6.03 RHR heat exchanger	2.5/2.6	1
007 Pressurizer Relief/Quench Tank			x									K 3.01 Effects on Containment	3.3/3.6	1
008 Component Cooling Water								x				A 2.02 SRO 66	3.2/3.5	1
041 Steam Dump/Turbine Bypass Control												NA		
045 Main Turbine Generator				x								K 4.11 T/G Rx trip	3.6/3.9	1
076 Service Water														
078 Instrument Air														
K/A Category Point Totals:	0	0	1	1	0	1	0	1	0	0	0	Group Point Total:		4

Plant-Specific Priorities

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

Facility: Vogtle		Date of Exam: 12/20/99		Exam Level:SRO
Category	K/A #	Topic	Imp.	Points
Conduct of Operations	2.1.	G2.1.1 sro only	3.7/3.8	1
	2.1.	G2.1.20 both	4.3/4.2	1
	2.1.	G2.1.34 sro only	2.3/2.9	1
	2.1.	G2.2.1 both	3.7/3.6	1
	2.1.	G2.2.13 both	3.6/3.8	1
	2.1.			
	Total			5
Equipment Control	2.2.	G2.2.26 sro only	2.5/3.7	1
	2.2.	G2.2.28 sro only	2.6/3.5	1
	2.2.	G2.2.6 sro only	2.3/3.3	1
	2.2.	G2.3.10 both	2.9/3.3	1
	2.2.			
	2.2.			
	Total			4
Radiation Control	2.3.	G2.3.2 sro only	2.5/2.9	1
	2.3.	G2.3.6 sro only	2.1/3.1	1
	2.3.	G2.3.9 sro only	2.5/3.4	1
	2.3.			
	2.3.			
	2.3.			
	Total			3
Emergency Procedures/ Plan	2.4.	G2.4.10 both	3.0/3.1	1
	2.4.	G2.4.21 both	3.7/4.3	1
	2.4.	G2.4.38 sro only	2.2/4.0	1
	2.4.	G2.4.44 sro only	2.1/4.0	1
	2.4.	G2.4.9 sro only	3.3/3.9	1
	2.4.			
	Total			5
Tier 3 Point Total (SRO)				17

Outline and initial exam submittal
designated under RIDS Code A070

DISTRIBTION CODE
A070

Facility: __ VOGTLE ~~VOTGLE~~___________ Scenario No.: ___2_____ Op-Test No.: ________

Examiners: _R. BALDWIN _____________ Operators:________________________

Objectives: _ The crew members should respond to failures in accordance with plant procedures and guidelines.

Initial Conditions: _*IC 14 (reduce to 90% Reactor Power), ~~5 GPD TUBE LEAK ON # 2 S/G, THUNDERSTORMS IN AREA PROCEDURE XXX HAS BEEN COMPLETED. Radiation Monitor for SG # 4 OOS~~, #4 SG ARV OOS with red tag (INFO LCO), ~9 GPD tube leak on # 2 S/G (SG-01B @ 0.001%), PDP inservice., override BIT discharge valve 1-HV-8801B Shut. Switch aux steam to U2 and swap to aux steam per 18009 section B.*

Turnover: Reactor: Maintain 100 % power. Motor Driven AFW "A" is OOS for bearing replacement 16 hours into the 72 hour action statement. Repair to be completed in 4 hours. , #4 SG ARV OOS (INFO LCO), ~9 GPD tube leak on # 2 S/G (18006-C section B in progress), tordado warning for burke county, procedure 11889-C has been completed. # 4 steam line radiation monitor OOS. ~~Motor Driven A is OOS for bearing replacement 16 hours into the 72 hour action statement. Repair to be completed in 4 hours. , #4 SG PORV OOS, #4 SG Radiation Monitor OOS, Tube leak on # 2 SG at 5 gpd.~~ Standing order to monitor RCP #1 vibrations hourly. RCP should be shutdown within 4 hours if shaft vibration exceeds 15 mils

Event No.	Malf. No.	Event Type*	Event Description
1	CV07	C/N/R O/SR O	Loss of operating charging pump, (PDP pump), ~~the operating pump,~~ Procedure 18007-C, Section B Loss of Charging Flow. Requires letdown to be isolated and therefore ~~needs~~ subsequently to be returned to service. This will be a normal for the RO candidate. In addition this requires startup of a standby charging pump by the RO.

DISTRIBUTION CODE
A070

			This will leave 2 CCPs for operation.
2	CV12	I/RO/ SRO	VCT level Transmitter LT 185 Fails High. No audible alarm , but actual VCT level will decrease at the rate of letdown flow. ~~Override the automatic make-up function from LT 112.~~ ~~This should be the Oconee event! If it is not, can we make it do this to resemble this event?~~ No specific procedure direction. This will test system knowledge & diagnostic skills. Long term success path is placing LV112A in the VCT position
3	~~RP10~~ Override ALB170 08E04 To ON	C/R/R O/SR O	High shaft Vibration alert for RCP # 1. This will cause the crew to have to decrease power. RCP procedure 13003-1, RCP Operation states that the RCP should be shutdown when shaft vibration is 20 mils or greater and the frame vibration is 5 mils or greater. The malfunction should not go that high. This would allow the operators to decrease power to get credit for a reactivity manipulation. Local panel indicates 16 mils shaft vibration and steady on RCP #1. Frame vibs are all ~2 mils for all RCPs. Shafts of other RCPs are about 5 to 7 mils Prompt to ramp power down if consult ops management
4	Override ALB170 63A05 ON SG-01A Ramp to 25% over 10 minutes	M	During the power decrease the plant will get a loose parts monitor alarm 17063-1, A05. Metal Impact MON SYS PNL Alarm will come in. This will require the crew to enter procedure ~~19039~~18039-C, Confirmed Loose Part in the RCS or Steam Generator Secondary Side. This will represent the RCP pump breaking and making its way to the Steam Generator. The crew should implement 18039-C. This may cause the crew to use the Rapid Power Reduction procedure, 18013-C. This will cause a tube leak in the # 1 ~~RCP~~S/G. Corresponding to the # 1 RCP problem. The crew would also initiate 18009-C, SG Tube leak. (Large) Ultimately, the tube leak will escalate until there is a tube

			rupture. ~~Tube rupture occurs on Reactor trip.~~ Prompts: 1. Duty manager from engineering that tape analysis confirms loose part on primary of SG#1 2. Multiple sustained impacts in SG#1 channel head (eng) 3. Implement 18013-C rapid down power AOP
	Override on a trigger set to reactor trip		Have the SG ~~PO~~ARV on the # 1 Steam Generator triggered to stick open on the reactor trip by use of the controller up overide. Manual control from the control room is not available. However, .local isolation will isolate the ~~PO~~ARV. May have to go to 19020-C, FAULTED STEAM GENERATOR ISOLATION. Depending on the crew's actions and the time it takes them to get a person out to the ~~PO~~ARV for manual operations.
	Override HV8801 B shut ES08 ES16.		Automatic actuation ~~does~~ of SI will not occur. The operators will have to ~~manipulate~~ manually actuate SI via the main control board switches ~~to align the system~~.. Bit ~~Valve~~ valve 8801B ~~Will~~ will not automatically nor will it manually reposition. One flow path through the BIT will not ~~work~~function.

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

Op-Test No.: _____ Scenario No.: _____ Event No.: _____ Page ___ of ___

Event Description: ________________________________

Time	Position	Applicant's Actions or Behavior
	RO	Diagnoses PD pump trip and isolates CVCS letdown. A CCP is placed in service and CVCS letdown is then restored
	USS	Directs crew actions using 18007 section B for loss of charging
	RO	Diagnoses LT-185 failure and initiates procedure 17007-1 for alarm E05. Verify proper automatic makeup to VCT and/or place HS-112A in the VCT position to stop diverting to the holdup tanks
	RO & USS	Diagnose RCP shaft alert alarm as RCP #1 problem and begin power descent in order to secure RCP #1 within 4 hours.
	BOP	Responds to DMIMS alarm and using 17063-1 determines that the loose part has moved into SG #1 primary side channel head by alarms information provided by the simulator operator
	USS	Dtermines that loose part is confirmed and enters 18039-C and possibly 18013-C to reduce power.
	USS	Enters 18009-C section A when SGTL is diagnosed by BOP/RO
	Crew	Manually trips reactor when PRZR level cannot be maintained
	USS	Enters E-0 then E-2 then E-3 (or E-0 to E-3 to E-2 then E-3)
	RO	Manually actuate SI and diagnose BIT isolation valve will not open

Facility: __~~VOTGLE~~VOGTLE____________ Scenario No.: ___1_____ Op-Test No.: ________

Examiners: _R. BALDWIN ____ Operators:

_B. Holbrook________
_M. Sykes___________

Objectives: _The crew members should respond to failures in accordance with plant procedures and guidelines.

Initial Conditions: ~~_5 GPD TUBE LEAK ON # 2 S/G, THUNDERSTORMS IN AREA PROCEDURE XXX HAS BEEN COMPLETED. # 4 SG Radiation Monitor OOS~~ IC 14 (100% - Reduce to 90%), Override C panel reactor trip handswitch, , ~9 GPD on S/G # 2 (SG-01b @0.001%). AF02A MDAFW-B trips on start.

Turnover: ~~80~~90% power with power ascension in progress.. Motor Driven AFW "A" is OOS for bearing replacement 16 hours into the 72 hour action statement. Repair to be completed in 4 hours. , #4 SG ~~PORV~~ ARV OOS (INFO LCO), ~9 GPD tube leak on # 2 S/G, tordado warning for burke county, procedure 11889-C has been completed. # 4 steam line radiation monitor OOS.

Event No.	Malf. No.	Event Type*	Event Description
1	FW02c (100% Ramp in over 120 sec)	I/BOP/ SRO	Feed Flow transmitter failure high on # 3 S/G. This will be a slow failure to allow time for the operator to find and analyze the problem.
2	NI07a	I/RO/ SRO	Power range Upper Detector fails. Procedure 18002-C, Nuclear Instrumentation System Malfunction, Section D. Power Range Drawer N41~~, 42, 43, 44~~ Malfunction.

~~3~~	~~CV21~~	~~C/N/ RO/ SRO~~	~~Reactor Coolant Filter Blockage. Sliding scale to ultimately fully blocked. PV-131 will open to control pressure, until it will not control pressure anymore then the low pressure letdown relief valve to the VCT opens. Procedure 18007-C, Section A, Total Loss of Letdown Flow. This will require the restoration of letdown~~. (Replace this one due to no significant action required of RO. Filter is simply removed from service via local actions that clears alarm and restores CVCS letdown parameters to normal ....
3	CV15	C/N/ RO/ SRO	Failure of TE-15214C will cause valve HV-15214 to close due to a CVCS pipe break room protection actuation. The pipe break actuation annunciator will alarm and the temperature indicator for TE-15214C will indicate high. Valve HV-15214 will isolate normal letdown, however letdown will continue thru the Letdown relief until the orifice isolation valves are closed. The crew should place excess letdown inservice.
4	FW01A ~~TU06~~ Overide Load Setback ckt)	C/BOP /R/RO/ SRO	SG Feed water pump trip. With a failure of the ~~automatic turbine run~~ load setback circuitry. Manual ~~runback will occur~~load reduction will function. Use procedure 18016-C, Section "A", MFP(s) Malfunction. Must reduce ~~reactor power and~~ turbine load to within the capacity of one main feed pump (approx. 70% reactor power). This will be a reactivity evolution for the RO candidate and the component evolution for the BOP candidate.
5	FW04C / FW06 (at 50%)	M/RO/ BOP/ SRO	# 3 Feed Reg valve Fails Closed. ~~Will this be able to be made to do a slow failure? Some more time to start shutting down further.~~ Once it is determined that the valve goes completely shut and a manual reactor trip has been inserted then insert FW06, Feed water line Rupture Inside Containment on line # 3. Override the manual reactor trip switch closest to the reactor operator (C Panel). The other reactor trip (B Panel) switch will operate. ***Remove the override immediately after the reactor trip***
	Override HS to		Failure of one of the Containment coolers to shift to low speed. The low speed winding handswitch should be

	off		overriden to the stop position
	AF02c		Turbine driven AFW pump will start but trip on overspeed and will not immediately be available. The trip should be inserted as soon as MSLI occurs.
	Override		Failure of one of the SI flow indicators. AS IS. (SIP-B FI-922)
			~~Auxiliary Feed water valve 5134 will not close. This will require the operators to secure the B MDAFW pump in order to stop feeding the # 3 SG. This will also cause a transition to FR-H.1 from E-0 at step 18, because there will be no feed water flow. Or from the foldout page.~~ (two possible correct paths – Low discrimination factor) Loss of the B MDAFW due to short in motor windings

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

Op-Test No.: _____ Scenario No.: _____ Event No.: _____ Page ___ of ___

Event Description: ______________________________

Time	Position	Applicant's Actions or Behavior
0005	BOP	Takes manual control of MFRV #3 and both MFPs speed
	USS	Enters AOP 18001 section G. The failed channel is removed from service, then the MFPs and MFRV#3 is returned to automatic.
0015	RO	Diagnoses the failed N41 upper detector failure and places rods in manual.
	USS	Enters AOP 18002-C section B, removes the failed channel from Service and addresses technical specifications
0025	RO/BOP	Responds to alarm for CVCS pipe breack protection actuation
	USS	Enters 18007-C section A fro loss of CVCS letdown. Crew diagnoses problem as a failed instrument channel. Excess letdown is placed in service until repairs are completed
0040	BOP	Recognizes MFP trip. Will have to manually lower turbine load, start 3rd condensate pump and max remaining MFP speed.
	RO	Drive control rods in to keep Tave/Tref matched
0055	USS	Enters 18016-C section A for loss of MFP
	Crew	Attempts manual control of MFRV#3. Reactor is manually tripped by RO using alternate Handswitch.
	RO	Diagnoses CNMT cooler failure to start and SI pump B flow

	BOP	Diagnoses faulted SG #3 IRC
	USS	E-0 to E-2 to E-1 then to FR-H.1
	USS	Enters FR-H.1, crew should depressurize an intact SG and feed that SG with condensate pumps.

Facility: __VOTGLE____________ Scenario No.: ___3____ Op-Test No.: ________

Examiners: _R. BALDWIN __________ Operators:

Objectives:

Initial Conditions: ~9 GPD TUBE LEAK ON # 2 S/G (SG-01B @ 0.001%), IC14 100% power, MSL monitor #4 OOS. MDAFW pump A in PTL, tagged

Turnover: Maintain 100 % power. Motor Driven A is OOS for bearing replacement 16 hours into the 72 hour action statement. Repair to be completed in 4 hours. , #4 SG ARV OOS, #4 SG Radiation Monitor OOS, Tube leak on # 2 SG at 9 gpd.

Event No.	Malf. No.	Event Type*	Event Description
1	~~CV03 Override~~ Override TV-130 to close valve (CNT-UP)and TV-129 to VCT postion And ALB 17007F 04 to OFF	C/N/ RO/ SRO	~~Letdown Isolation Valve LV-460 Fails Closed, with a failure of the circuit for the letdown orifice valves not shutting as required. This would require the RO candidate to have to recognize these valves did not close and manually isolate the letdown orifice isolation valves in accordance with AOP 18007-C, CVCS Malfunction.~~ Could not overide orifice isolation valves to stay open ~~Valve 460 would not be able to be opened~~ This simulates a malfunction in the control circuit for TV130 and a malfunction of TIS-129. The operator will have to isolate CVCS letdown and recognize that TV129 did not divert as designed. ~~causing t~~The operators to have to place excess letdown in service in accordance with procedure SOP 13008. This would be the normal portion of the event.
			RCS NR hot leg temperature instrument on loop 2 will fail high. The problem is addressed using procedure 18001

	RC08B @100%		section B. The USS should refer to Tech Spec and diagnose the inop OTdeltaT and OPdelta T trip instruments. Carefully set initial value =current value or indication will spike down then up
2	PR02a PR05 @10% ~~Override~~	I/RO /SRO	PR02a Pressurizer Pressure Transmitter Fails (Prot and Cont) PT 455 Fails High. A false high pressure, causes the associated PORV to open. PORV-455A will stick partially open after the intial transient and cause RCS pressure to cycle near 2185 psig. ~~And spray valves to open.~~ ~~Would like to have one spray valve not close fully.(The spray valve that is associated with the # 4 SG). But the indication that it fully closes but still causes a decrease in pressure and level.~~ Unable to stick spray valve a specific amount open, operators would probably trip the unit very quickly as pressure decreased rapidly ~~The pressure decrease should be slow enough to allow the operators to start a power decrease.~~ The USS should diagnose that the unit is now in action statement 3.0.3 due to the OtdeltaT trip function on loops 1 & 2 being INOP and a unit shutdwn would have to be implemented if repairs are not completed in time.
3	MS02c @12% RD10	M/All	Main steam line rupture outside containment Loop 3. Three rods do not fully trip into the core during the reactor trip. Pick three rods such that they are not close. Two can be close but the third not close to the others. ~~This would cause the entry into E-0 and then step through the first 4 steps of FR-S.1, then back to E-0.~~ ~~Would Emergency boration would be required due to TS #3.1.4 more then one rod need to e borate to be accomplished within one hour?~~ Will need to go to 19020-C, E-2, Faulted Steam Generator Isolation. Will need to go to 19010-C , E-1 Loss of Reactor or Secondary coolant at Step 26 of E-0.
	~~Override~~		~~Emergency Borate Valve does not operate from the control~~

	Overide HV8104 shut		~~Room. Need to send an operator to operate locally.~~ HV8104 will not open from control board. RO will have to use
	Override HV112B and HV112C		Automatic swap over from the VCT to the RWST does not work. It will be necessary for the RO identify and manually swap over.-
	CV16B		Failure of the Standby CCP to start on the SI.

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

Op-Test No.: _____ Scenario No.: _____ Event No.: _____ Page ___ of ___

Event Description: ______________________________

Time	Position	Applicant's Actions or Behavior
	RO	Respond to LTDN high temperature alarm due to TV-130 going shut. Should isolate letdown and ID that TV-129 did not divert Excess letdown will be placed in service
	RO	Diagnose NR RCS temperature instrument failure, control rods placed in manual. AOP 18001-C section B entered
	USS	Uses 18001-C to remove failed temperature channel from service and ID tech spec implications
	RO	Diagnose PT-455 failed high, manually close both sprays and PORV-455 and energize heater as necessary. Diagnose that PZR heater group D will not energize
	USS	Use 18001-C to remove PZR channel 1 from service and ID that OT delta T trip fuinction is INOP on 2 channel requiring LCO 3.0.3
	BOP/RO	Diagnose steam leak ORC and reduce turbine load to keep power < 100% per 18008-C
	Crew	Manually trip reactor and then isolate steam lines, ID that 3 rods stick out when reactor is tripped
	USS	Enter E-0 then E-2 then E-1 then ES-1.1
	RO	Manually start CCP-B after the auto start failure on the SI signal
	RO	Manually open HV-112D and HV-112E when verifying ECCS valve alignment

Facility: __VOTGLE____________ Scenario No.: ___3____ Op-Test No.: _______

Examiners: _R. BALDWIN _________ Operators:

Objectives:

Initial Conditions: ~9 GPD TUBE LEAK ON # 2 S/G (SG-01B @ 0.001%), IC14 100% power, MSL monitor #4 OOS. MDAFW pump A in PTL, tagged

Turnover: Maintain 100 % power. Motor Driven A is OOS for bearing replacement 16 hours into the 72 hour action statement. Repair to be completed in 4 hours. , #4 SG ARV OOS, #4 SG Radiation Monitor OOS, Tube leak on # 2 SG at 9 gpd.

Event No.	Malf. No.	Event Type*	Event Description
1	~~CV03 Override~~ Override TV-130 to close valve (CNT-UP)and TV-129 to VCT postion And ALB 17007F 04 to OFF	C/N/ RO/ SRO	~~Letdown Isolation Valve LV-460 Fails Closed, with a failure of the circuit for the letdown orifice valves not shutting as required. This would require the RO candidate to have to recognize these valves did not close and manually isolate the letdown orifice isolation valves in accordance with AOP 18007-C, CVCS Malfunction.~~ Could not overide orifice isolation valves to stay open ~~Valve 460 would not be able to be opened~~ This simulates a malfunction in the control circuit for TV130 and a malfunction of TIS-129. The operator will have to isolate CVCS letdown and recognize that TV129 did not divert as designed. ~~causing t~~The operators to have to place excess letdown in service in accordance with procedure SOP 13008. This would be the normal portion of the event.
	RC08B @100%		RCS NR hot leg temperature instrument on loop 2 will fail high. The problem is addressed using procedure 18001 section B. The USS should refer to Tech Spec and diagnose the inop OTdeltaT and OPdelta T trip instruments. Carefully set initial value =current value or indication will spike down then up

2	PR02a PR05 @10% ~~Overrid e~~	I/RO /SRO	PR02a Pressurizer Pressure Transmitter Fails (Prot and Cont) PT 455 Fails High. A false high pressure, causes the associated PORV to open. PORV-455A will stick partially open after the intial transient and cause RCS pressure to cycle near 2185 psig. ~~And spray valves to open.~~ ~~Would like to have one spray valve not close fully.(The spray valve that is associated with the # 4 SG). But the indication that it fully closes but still causes a decrease in pressure and level.~~ Unable to stick spray valve a specific amount open, operators would probably trip the unit very quickly as pressure decreased rapidly ~~The pressure decrease should be slow enough to allow the operators to start a power decrease.~~ The USS should diagnose that the unit is now in action statement 3.0.3 due to the OtdeltaT trip function on loops 1 & 2 being INOP and a unit shutdwn would have to be implemented if repairs are not completed in time.
3	MS02c @12% RD10	M/All	Main steam line rupture outside containment Loop 3. Three rods do not fully trip into the core during the reactor trip. Pick three rods such that they are not close. Two can be close but the third not close to the others. ~~This would cause the entry into E-0 and then step through the first 4 steps of FR-S.1, then back to E-0.~~ ~~Would Emergency boration would be required due to TS #3.1.4 more then one rod need to e borate to be accomplished within one hour?~~ Will need to go to 19020-C, E-2, Faulted Steam Generator Isolation. Will need to go to 19010-C , E-1 Loss of Reactor or Secondary coolant at Step 26 of E-0.
	~~Overrid e~~Overid e HV8104 shut		~~Emergency Borate Valve does not operate from the control Room. Need to send an operator to operate locally.~~ HV8104 will not open from control board. RO will have to use
	Overrid e HV112B and		Automatic swap over from the VCT to the RWST does not work. It will be necessary for the RO identify and manually swap over.

	HV112 C		
	CV16B		Failure of the Standby CCP to start on the SI.

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

Op-Test No.: ______ Scenario No.: ______ Event No.: ______ Page ____ of ____

Event Description: ______

Time	Position	Applicant's Actions or Behavior
	RO	Respond to LTDN high temperature alarm due to TV-130 going shut. Should isolate letdown and ID that TV-129 did not divert Excess letdown will be placed in service
	RO	Diagnose NR RCS temperature instrument failure, control rods placed in manual. AOP 18001-C section B entered
	USS	Uses 18001-C to remove failed temperature channel from service and ID tech spec implications
	RO	Diagnose PT-455 failed high, manually close both sprays and PORV-455 and energize heater as necessary. Diagnose that PZR heater group D will not energize
	USS	Use 18001-C to remove PZR channel 1 from service and ID that OT delta T trip fuinction is INOP on 2 channel requiring LCO 3.0.3 entry.
	BOP/RO	Diagnose steam leak ORC and reduce turbine load to keep power < 100% per 18008-C
	Crew	Manually trip reactor and then isolate steam lines, ID that 3 rods stick out when reactor is tripped
	USS	Enter E-0 then E-2 then E-1 then ES-1.1
	RO	Manually start CCP-B after the auto start failure on the SI signal
	RO	Manually open HV-112D and HV-112E when verifying ECCS valve alignment

1". "Given the following conditions:

NSCW pumps 1,2,3, and 6 are in service
A loss of both RATs occurs
Both EDGs start and complete their UV sequence

Which one of the following choices correctly describes the expected response of the NSCW system to these conditions?

A. Pump 4 will start first and then pumps 1,2, and 3 will start when their discharge valves are fully closed.

B. Pumps 4 and 5 will start first and then pumps 1 and 2 will start when their discharge valves are fully closed.

C. Pumps 1,2,3, and 6 will start simultaneously.

✓D. Pumps 1,2,3, and 4 will start simultaneously.

EB# HL-LP-06101-01-01 (#6)

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
ME01	2	NCSW	062 AK3.02	3.6 / 3.9	BANK	MEMORY	BOTH

DISTRIBUTION CODE
A070

2". "An intermediate feedline break has occurred on Unit 2. The reactor can be maintained on line for about five minutes without an automatic trip. Which one of the following describes the expected plant response to an intermediate size steam line break prior to the reactor trip? Assume all control systems are in a normal automatic lineup.

A. Turbine load will drop and rods will step out.

✓ B. Turbine load will drop. Rods will not move until the reactor trips.

C. Turbine load will not change until the reactor trips. Rods will step out.

D. Turnbine load will not change until the reactor trips, rods will not move.

REF: LO-LP-37121-13-C, page 5

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
ME02	2	SEC BREAK	040EA1.18	4.2 / 4.2	NEW	ANALYSIS	BOTH

3". "In accordance with 92005-C, “Fire Response Procedure,” which one of the following is NOT a mandatory requirement of the Fire Team Captain (FTC) during the mobilization phase of a fire in the plant?

A. Obtains a set master keys.

✓B. Dresses out in protective fire fighting apparel.

C. Obtains a copy of the areas fire fighting preplans.

D. Secures a portable radio.

Reference: 92005-C, Fire Response Procedure

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
RSB03	2	PLNT FIRE	067 2.4.2	3.0/3.5	NEW	MEMORY	SRO

4". "Due to a partial loss of power, Unit 2 RCPs 1 and 4 tripped, causing a reactor trip from 100% power. Assume no loss of RCS inventory. Which one of the following describes the expected readings on RVLIS for the reactor vessel upper range (Δpa); full range (Δpb); and dynamic head (Δpc)?

	upper range	full range	dynamic head
A.	100%	100%	off scale low
B.	100%	100%	47%
C.	120%	120%	off scale low
✓D.	120%	120%	47%

REF: LO-LP-16701-11-C, page 8,9

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
ME04	3	RVLIS	074 EA1.01	3.8/3.8	NEW	COMP	BOTH

5". "Step 5 of procedure 19241-C, "Response to Imminent Pressurized Thermal Shock Condition," directs the operator to determine if ECCS flow can be terminated. Which one of the following describes the procedural action to be taken if termination criteria are NOT met?

✓A. Attempt to start one RCP in accordance with the Attachment only if subcooling requirements are satisfied.

B. Attempt to start one RCP in accordance with the Attachment regardless of subcooling requirements.

C. Depressurize the RCS by stopping one train of ECCS pumps.

D. Depressurize the RCS using PORV or Aux spray.

EB# LO-LP-37071-06-02 (#219, page 193) a&b are reworded, c was changed from "stop ECCS pumps to "stop one train of ECCS pumps.
REF: 19241-C, page 6

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
ME05	4	PTS	WE08 EK1.1	3.5 / 3.8	MODIFIED	COMP	RO

6". "Unit 1 has had a loss of offsite power and is cooling down using 19002-C, Natural Circulation Cooldown. RCS temperature is 500 degrees. Power has just been restored to the CRDM fans. Which one of the following describes the effect of starting all CRDM fans will have on the cooldown?

A. The fans will contribute an additional 15-20 degrees per hour RCS cooldown. A GREATER amount of subcooling is procedurally required for cooldown.

✓B. The fans will contribute an additional 15-20 degrees per hour RCS cooldown. A SMALLER amount of subcooling is procedurally required for cooldown.

C. The fans will not significantly contribute to the overall RCS cooldown rate. A GREATER amount of subcooling is procedurally required for cooldown.

D. The fans will not contribute to the overall RCS cooldown rate. A SMALLER amount of subcooling is procedurally required for cooldown.

REF: LO-LP-37-012-13-C, page 8

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
ME06	3	NAT CIRC	WE09 EA2.1	3.1 / 3.8	NEW	MEMORY	RO

7". "Unit 1 has tripped due to an electrical fault and the following conditions are observed:

- All Channel I trip status lights (except P-6, CNMT HI-3 and RWST LO-LO LEVEL) energized.

- A loss of Intermidiate Range Channel N-35.

Which one of the following describes the Source Range Channel(s) which will be available to monitor reactor power if no actions are taken?

A. There will be not Source Range Channels available.

B. N-31 only.

✓C. N-32 only.

D. Both N-31 and N-32 .

REF: 18032-1, Rev. 15, page 2 of 78

The stem describes a loss of bus 1AY1A. N-31 is powered from this bus.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
ME07	3	120 VAC	057 AA2.18	3.1 / 3.1	NEW	MEMORY	BOTH

8". "Unit 2 is operating at 100% power with PZR level at 60% and both PZR spray valves in manual and shut while I&C is investigating erratic responses.

A main turbine control failure results in a rapid load reduction causing RCS temperature, PZR level, and PZR pressure to go up rapidly. The RO stabilizes RCS pressure at 2300 psig by manually cracking open one spray valve. Pressure is held constant at 2300 psig for several minutes. The RO then observes that PZR level is 68%, PORV 455 is shut, PORV 456 is shut, and the backup heaters are on.

Which one of the following describes the status of the Pressurizer Pressure Control system?

A. Functioning properly.

✓B. Malfunctioning because PORV 455 should be open.

C. Malfunctioning because PORV 456 should be open.

D. Malfunctioning because the backup heaters should be de-energized.

EB# LO-LP-16303-03-19 (#253)
changed 455 position to shut in stem which changed the answer from a to b.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
ME08	3	PZR PCS	027 2.1.7	3.7 / 4.4	MODIFIED	MEMORY	RO

9". "Which one of the following's instrumentation may be unreliable in the event that the control room is evacuated due to fire?

✓A. Shutdown Panel A.

B. Shutdown Panel B.

C. Shutdown Panel C.

D. TSC Plant Computer.

REF: 18038-1, page 6

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
ME09	2	CR EVAC	068 AK2.03	2.9 / 3.1	NEW	MEMORY	BOTH

10". "Given the following conditions:
- A total loss of ACCW has occurred at 0220 EST.
- The RCP temperatures are being monitored on the IPC.
- The RCP vibration is being monitored.
- Reactor power is 30%.
- The time is currently 0226 EST.

Which ONE of the following is the required action for the operator?

✓A. Trip the reactor then trip all RCP's before 0230 EST.

B. Trip any RCP if its #1 seal leakoff temperature exceeds 195 degrees F.

C. Trip any RCP that has its thermal barrier isolation valve shut.

D. Trip any RCP with shaft vibration in excess of 5 mils before 0230 EST.

REF: 18022-C,
EB#: LO-LP-60318-05-01 (added 1 hour and 5 minutes to all times)
need to modify some distractors so that one other than the answer has a time.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
ME10	2	CCW	026 AK3.03	4.0 / 4.2	NRC 98	ANALYSIS	RO

11". "The unit 2 main generator has just been synchronized to the grid and power has been raised to 18% power. The BOP was preparing to swap feedwater flow from the Bypass Feed Regulation Valves (BFRV) to the Main Feed Requlation Valves (MFRV) when condenser vacuum decreased to 21.5 inches of water generating a turbine trip.

Which one of the following are the correct actions the crew should take in response to the turbine trip?

A. Enter 18011-C, "Turbine Trip below P9," and reduce reactor power below 5% and control Tave using steam dumps.

B. Trip the reactor and go to 19000-C, "Reactor Trip or Safety Injection."

C. Enter 18016-C, "Condensate and Feedwater Malfunctions," start all available AFW pumps, and reduce reactor power to 10%.

✓D. Enter 18011C, "Turbine Trip below P9," reduce reactor power below 5%, and control Tave using atmospheric relief valves.

1995 NRC SRO 69
REF: LO-LP-60311, 18011C,
there is a different question with this bank number in the current book of questions. Did it supersede this question?

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
ME11	3	LOSS VAC	051 AA2.02	3.9 / 4.1	NRC 95	ANALYSIS	BOTH

12". "A loss of all AC has occurred. The control room operators have completed the immediate operator actions of 19100-C,"FR-S.1 Loss of All AC Power," and have attempted without success, to restore power. Per procedure 19100-C, the control switches for ESF 4160V loads are placed in the Pull-To-Lock position.

Which one of the following describes the adverse effect which placing these loads in Pull -To-Lock is designed to prevent?

✓A. Overloading of electrical buses.

B. Starting loads without cooling water or lubrication.

C. An uncontrolled cooldown of the RCS and possible reactor startup.

D. The unnecessary use of water that may be needed for long term cooldown.

1995 NRC SRO 70 (stem slightly reworded; new distractor b)
REF: 19100C,
EB#: LO-LP-37031-07-02

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
ME12	2	LOSP	055 EK3.02	3.1 / 3.1	NRC 95	MEMORY	RO

16". "Which one of the following conditions describes an INOPERABLE Containment per LCO 3.6.1?

A. The outer containment airlock door is found open in MODE 2.

B. The inner containment airlock door is left open while performing maintenance on its O-rings in MODE 3.

✓C. Both containment airlock doors are opened for maintenance in MODE 4.

D. A containment penetration exceeds Tech Spec leakage rate limits in MODE 5.

EB #LO-LP-39210-01-05

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
ME16	2	CONT INTG	069 AA2.01	3.7/4.3	NRC 95	MEMORY	BOTH

Trip
Water
PX

17". "***References allowed***

Reactor power was being raised from ~~50~~ to 100% using rods and dilution. A continuous rod withdrawal event occurred that resulted in an AFD of (+15, ~~80~~ 70) and a QPTR of 1.15. Which one of the following is the highest power level that meets technical specification actions?

Round Stem

A. 61% RTP

✓B. 55% RTP

C. 50% RTP

D. ~~35~~ 25% RTP

Reference: TS 3.2.3, 3.2.4; Tab 6.0 of PTDB; ~~VEGP 18003-C, Page 8 of 21.~~

KA 000001G 2.1.33 (3.4/4.0)

Author: RFA
Distractor analysis:

a. Incorrect answer per TS 3.2.4: Limit thermal power to >/= 3% below RTP for each 1% of QPTR > 1.00. Plausible if applicant uses a QPTR of 1.02, then 1.15-1.02=0.13. (0.13) x 3 = 39. 100-39=61%

b. **Correct answer** per TS 3.2.4: Limit thermal power to >/= 3% below RTP for each 1% of QPTR > 1.00. 1.15-1.00=0.15. (0.15) x 3 = 45. 100-45=55%

c. Incorrect answer because the AFD is inside the doghouse for ~~80~~ 70% RTP. Plausible if applicant misreads Tab 6.0 in the PTDB.

d. Incorrect answer. Plausible if applicant uses a QPTR of 1.00, then 1.15-1.00=0.15. (0.15) x 3 = 45. Applicant uses ~~80%~~ 70 instead of 100% RTP: Then ~~80-45=35%~~
70-45-25

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
RFA01	3	ROD WITHD	001G2.1.33	3.4/4.0		ANALYSIS	BOTH

18". "

References allowed

Which one of the following describes how pressurizer level and reactor power will respond to a loss of reactor coolant makeup to the VCT?

- SR 3.5.4.2 and SR 3.5.4.3 have just been completed. RWST boron concentration was found to be 1240 ppm.
- The reactor is at 100% RTP, ARO.
- VCT level transmitter LT 459 failed high.
- Prior to the VCT level transmitter failure, pressurizer level and Tave were at program level and temperature respectively.
- Cycle BU is 4000 MWD/MTU, HFP, equilibrium Xenon.

A. Level will increase, power will remain the same.

B. Level will decrease, power will increase.

✓C. Level will remain the same, power decrease.

D. Level will decrease, power will remain the same.

Reference: PTDB, Tab 11.0; TS 3.5.4; TS SR 3.5.4.2 & 3.5.4.3; VEGP 18007-C, Page 14.

K/A: 000022AA1.03 (3.2/3.2)

Author: RFA
Distractor analysis:

a. Incorrect answer: Level will NOT *increase* because inventory balance has not changed. Power will decrease due to increased boron ppm. Plausible if applicant misreads PTDB Tab 11.0 and miscalculates the boron difference.

b. Incorrect answer: Level will NOT *decrease* because inventory balance has not changed. Power will decrease due to increased boron ppm. Plausible if applicant misreads PTDB Tab 11.0 and miscalculates the boron difference.

c. **Correct answer:** Level remains the same due to no appreciable change in inventory balance. Power will decrease since the boron ppm difference is 1240-1224 (value taken from PTDB Tab 11.0, HFP, 4000 MWD/MTU BU) = +16 ppm boron.

d. Incorrect answer: Level will NOT *decrease* because inventory balance has not changed. Power will decrease due to increased boron ppm. Plausible if applicant misreads PTDB Tab 11.0 and miscalculates the boron difference.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
RFA02	3	LOSS MKUP	0022AA1.11	3.2/3.2	NEW	ANALYSIS	BOTH

19". "I & C just completed a surveillance on the high voltage power supply to the Source Range/ Intermediate Range (SR/IR) Nuclear Instruments. Voltage was 750 vdc (normally 850 vdc).

Which one of the following describes the affect and the reason that this lower than normal voltage has on SR/IR performance?

A. Indicated power will not be affected because the high voltage only supplies power to the electronic circuitry for the amplifier.

B. Indicated power will increase because of the lowered preamplifier low noise current input pulse.

C. Indicated power will decrease because smaller pulses are generated by the alpha decay of U235, and even smaller pulses are generated by gamma interactions in the detector.

✓D. Indicated power will decrease because the reduced voltage in the high voltage power supply provides less biasing to sweep ions from the fission chamber.

Reference: LO-LP-17103-00-C

K/A: 000033AK1.01

Author: RFA
Distractor analysis:

a. Incorrect answer: Indicated power will decrease because the high voltage power supply supplies the necessary bias to sweep ions from the fission chamber in all operating modes. Therefore, less biasing will occur resulting in a lower indicated power. Plausible if the candidate confuses the functions of the low and high voltages.

b. Incorrect answer: Indicated power will decrease because the high voltage power supply supplies the necessary bias to sweep ions from the fission chamber in all operating modes. Therefore, less biasing will occur resulting in a lower indicated power. The pre-amplifier modules contain a low noise, current input, pulse. The pre-amp, however, is not affected since high voltage has nothing to do with the pre-amplifier. Plausible if the applicant does not understand SR/IR operation.

c. Incorrect answer: Alpha decay of U235 has nothing to do with reduced high voltage. The small pulses are a result of the alpha decay. Plausible if the applicant does not understand the principles of neutron detection.

d. **Correct answer:** Power will decrease because the reduced voltage in the high voltage power supply provides less biasing to sweep ions from the fission chamber. These swept ions are directly proportional to power output.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
RFA03	3	SR NI VOLT	000033AK1.	2.7/3.0	NEW	COMP	BOTH

20". "During recovery actions of a misaligned control bank or shutdown bank A or B rod, a Rod Control Urgent Failure is received. This alarm is the result of:

A. the Pulser/Oscillator being inhibited during recovery actions.

B. the Lift Coils being disconnected for the group with the misaligned rod.

✓C. the Lift Coils being disconnected for the unaffected group in the affected bank.

D. the multiplexing failure which was generated during withdrawal of the misaligned rod.

Bank Question # 60
LO-LP-27

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
RSB 02	2	ROD CONTRO	003AK2.05	2.5/2.8	BANK		BOTH

21". "Unit 1 was at 100 percent rated thermal power, when a loss of all AC occurred. The Turbine Driven AFW pump ~~#3~~ was lined up to the # 2 CST. Motor Driven Auxiliary Feed Water Pumps were aligned to the # 1 CST. All buses energized properly, with the exception of the following buses that did not re-energize.

1ABB
1AA02
1CD1M
1NA05
1NA01
1NA04

do they know these?

Which one of the following represents the auxiliary feed water flow path to the Steam Generators?

A. Motor Driven Auxiliary Feed water pump ~~#3~~ A through HV-5137 and HV-5139 to Steam Generators # 1 and # 4, respectively.

✓B. Motor Driven Auxiliary Feed water pump ~~#2~~ B through HV-5132 and HV-5134 to Steam Generators # 2 and # 3, respectively.

C. Turbine Driven Auxiliary Feed water pump ~~#1~~ through HV-5122 and HV-5120 to Steam Generators # 1 and # 4, respectively and through HV-5125 and HV-5127 to Steam Generators # 2 and # 3, respectively.

D. Turbine Driven Auxiliary Feed water pump ~~#1~~ through HV-5125 and HV-5127 to Steam Generators # 2 and # 3, respectively.

Reference: LO-LP-20101-C27
KA: APE056AA1.10 (4.3/4.3)
Plausible Distractors:

A. Motor Driven AFW pump # 3 is powered from bus AA02, therefore, no power or flow to those S/Gs. Discharge valves are open in standby readiness. Discharge valves are powered from ABB but are assumed to be open. No power is necessary.

B. Motor Driven AFW pump # 2, has power and will provide flow. Correct answer.

C. 1CD1M provides power to HV-5106 Terry Turbine Steam supply isolation valve and the HV-5113, CST # 2 Suction valve. These valves will not open, therefore, no flow to any of the steam generators. Discharge valves are open in standby readiness.

D. 1DC1M provides power to HV-5106 and the HV-5113, CST # 2 Suction valve, Terry Turbine Steam supply isolation valve. This valve will not open, therefore, no flow to any of the steam generators. Discharge valves are open in standby readiness.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
RSB01	3	MDAFW	056 AA1.01	4.3/4.3	NEW	COMP	BOTH

22". "Which one of the following represents the Atmospheric Relief Valves that can be operated in the Fire Emergency mode?

A. PV-3000 and PV-3010

✓B. PV-3010 and PV-3020

C. PV-3020 and PV-3030

D. PV-3030 and PV 3000

Reference: LO-LP-21102-22C, Main Steam System, p. 6.

LO # 4, Identify where the Atomospheric Relief Valves can be controlled from. Describe the modes of control and available indications.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
RSB02	2	ARVS	E13 EK 2.1	(3.0/3.1)	NEW	MEMORY	BOTH

23. The operating crew entered procedure 19221-C, FR-C.1, "Response to Inadequate Core Cooling." All attempts to establish high pressure Safety Injection flow were unsuccessful. RVLIS level is 28% and decreasing slowly, Core Exit Thermocouples are reading 820oF and slowly increasing. Reactor Coolant pumps have been secured.

Which one of the following methods would be the NEXT step in mitigating the core cooling challenge?

A. Enter the Severe Accident Mitigation Guidelines.

B. Open available pressurizer PORVs to allow RCS depressurization to the SI accumulator and SI injection pressures.

✓C. Depressurize all intact steam generators using Steam dumps or ARVs to 200 psig to allow RCS depressurization to the SI accumulator and SI injection pressures.

D. Restart one RCP in an idle loop to provide forced two-phase flow through the core.

Reference: 19221-C, FR-C.1, "Response to Inadequate Core Cooling.
LO-LP-37061-09
10CFR55:41.7/45.7

000074
Distractor analysis:

A. It does not meet the requirements to enter the 1200°F transition criteria.

B. Meets the requirement to lower pressure but action initiates a loss of RCS inventory to accomplish.

C. Answer

D. Meets the requirement but is not the next step after high pressure SI is not successful.

North Anna 1999 RO examination.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
RSB04	2	CORE COOL	E06 EK2.1	3.6/3.8	NEW	MEMORY	BOTH

24". "Which one of the following does NOT require immediate termination of a liquid radioactive release?

✓A. An Offsite Dose Calculation Manual (ODCM) limit was exceeded.

B. A high discharge radiation alarm is received.

C. RE-0018 has failed.

D. Discharge radiation exceeds RE-0018 setpoint.

Same

Poss - use RE-0848

Reference: VEGP ODCM, Section 2.1; LO-LP-47110-17-C, Page 45.

K/A: 000059AA1.02 (3.3/3.4)

Author: RFA
Distractor Analysis:

a **Correct answer:** The ODCM states "With the concentration of radioactive material released in liquid effluents to unrestricted areas exceeding the limits in section 2.1.2, immediately restore the concentration to within the stated limits."

b. Incorrect answer: LO-LP-47110-17-C states the events that require immediate termination of a liquid radioactive release. They include: Failure of RE-0018, High discharge radiation alarm received, Discharge radiation exceeds RE-018 setpoint, Release rate exceeds rate specified on batch liquid release permit, and Dilution flow does not meet permit requirements.

c. Incorrect answer: See a and b distractor analysis above.

d. Incorrect answer: See a and b distractor analysis above.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
RFA05	2	LIQ RELEA	0059AA1.02	3.3/3.4	NEW	MEMORY	BOTH

25. "Which one of the following displays are available at the Data Processing Modules (DPM) communications console.

A. 30 most recent 10 minute periods, 24 most recent 1 hour periods.

✓B. 24 most recent 10 minute periods, 24 most recent 1 hour periods.

C. 72 (3 days) most recent 1 hour periods, 24 most recent 10 minute periods.

D. 30 most recent 1 hour periods, 72 (3 days) most recent 1 hour periods.

Reference: LO-LP-32101-30-C

K/A: WE16EK1.3 (3.0/3.3)

Author: RFA
Distractor analysis:

a. Incorrect Answer: At the DPM communications console, the following displays are available:

- 24 most recent 10 minute periods
- 24 most recent 1 hour periods
- 30 most recent 1 day periods

b. **Correct answer:** See distractor analysis "a".

c. Incorrect answer: See distractor analysis "a".

d. Incorrect answer: See distractor analysis "a".

New

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
RFA06	2	HIRAD CONT	WE16EK1.3	3.0/3.3	NEW	MEMORY	BOTH

26". "The plant is operating at 80 % power and steady state conditions. One feed water valve begins to drift open. Assuming no operator actions, what are the INITIAL changes in the steam generator ?

A. Fewer bubbles are formed, Approaches saturated conditions, Downcomer level decreases.

B. More bubbles are formed, Temperature of liquid is greater than Tsat, Downcomer level increases.

✓C. More bubbles collapse, Water is more dense, Resistance to flow increases.

D. Fewer Bubbles are formed, Resistance to flow decreases, Temperature of the tube bundle region rises.

C. LO-LP-18501-11-C, LO-4
A: downcomer decreases
B: fewer bubbles are formed
C: correct answer
D: Resistance to flow increases

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
LSM-003	2	AFW SOURCE	061A1.04	3.9/3.9	NEW	COMP	BOTH

Generic Not

Oper Oriented

D

27". "The plant is starting up, following a short outage, in which the condensate system remained in long cycle. You have been directed to start of third condensate pump. Under these circumstances which one of the following determines how you control the condensate demineralizer bypass valve and the reason for this?

A. Slow open to protect demineralizer elements from high differential pressure.

✓B. Fast open to increase Main Feed pump NPSH.

C. Slow open to prevent condensate system water hammer.

D. Fast open to provide constant steam packing exhaust condenser cooling flow.

B

LO-LP-1810-10C LO-2c, LO-5c

a: - slow open on high (to 10%) or high high (to 100%) to protect the elements only if signals are present.

b: correct answer.

c: This is the purpose of the condensate pump discharge valves.

d: This is the purpose of short cycle recirculation valve.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
LSM 002	2	CONDENSATE	056K1.03	2.6*/2.6	NEW	COMP	BOTH

28". "Which one of the following represents the dose or dose commitment to a member of the public from radioactive materials in liquid effluents released to unrestricted areas from each unit must be limited to:

A. During any calendar quarter, less than or equal to 1.5 rems to the whole body and less than or equal to 5 rems to any organ, and during any calendar year, less than or equal to 3 rems to the whole body and less than or equal to 10 rems to any organ.

B. During any calendar quarter, less than or equal to .15 rems to the whole body and less than or equal to .5 rems to any organ, and during any calendar year, less than or equal to .3 rems to the whole body and less than or equal to 1 mrem to any organ.

✓C. During any calendar quarter, less than or equal to 1.5 mrems to the whole body and less than or equal to 5 mrems to any organ, and during any calendar year, less than or equal to 3 mrems to the whole body and less than or equal to 10 mrems to any organ.

D. During any calendar year, less than or equal to 15 mrems to the whole body and less than or equal to 50 mrems to any organ, and during any calendar year, less than or equal to 30 mrems to the whole body and less than or equal to 100 mrems to any organ.

C. LO-LP-47110-17-C, LO-10
A: 1000 X the limit
B: 100 X the limit
C: this is the correct answer
D: 10 X the limit.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
LSM-007	2	LIQ WASTE	068K5.03	2.6/2.6	NEW	COMP	RO

New

the RW Opr observes that the

29". "Approximately 30 minutes after beginning a release of a waste Monitor tank ~~you notice the reading on~~ Radiation Monitor 1-RE-0018 is reading about 25% percent below the expected value. 1-RX-0018 does not show a trouble condition. What actions should you take based on procedure 13216-1, "Liquid Wate Release?"

A. Stop the release and notify the Unit Shift Supervisor and chemistry.

B. Place the waste Monitor tank on recirculation and notify the Unit Shift Supervisor and chemistry.

C. Verify the position of the discharge valve and adjust flow as necessary to return reading to expected value.

✓D. Continue the release and notify chemistry.

D. 13216-1 LO-LP-47110-17-C, LO-5

A: Not a required release termination

B: Recirculation is used for sampling

C: Total volume of release would increase, this may exceed permit

D: correct answer

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
LSM-008	2	LIQ WASTE	068A4.03	3.9/3.8	NEW		RO

4Q read on RE-

One step of procedure

29 to 105

31". "You are performing a normal venting of the PRT per procedure 13201-1, "Gaseous Waste Processing System." RE-13 fails low. What are the potential consequences?

A. PRT rupture disk could rupture.

B. High radiation levels could be released.

C. Gaseous waste release would be secured.

✓D. This would have no effects on the release.

D. LO-LP-46101 LO-5

A: occurs if WGT tank to be release has a pressure above 80 psi

B: occurs if RE-14 fails low

C: occurs if RE-14 fails high

D: correct answer

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
LSM-010	2	WASTE GAS	071A4.13	3.0/3.1	NEW	COGN	RO

32". "Which of the following is a containment ventilation interlock?

A. Control Rod Drive Mechanism Cooling Fans are interlocked to prevent operating two fans per train.

✓B. Preaccess MAIN Purge is interlocked to prevent simultaneous operations with the Mini purge system.

C. Reactor Cavity Cooling low temperature and low flow interlocks are enabled when the control switch is in the ON position.

D. Post LOCA Cavity Purge is interlocked with ~~normal~~ MAIN purge to prevent simultaneous operation.

B. LO-LP-29160, LO - 2c

A. Running two fans per train requires USS approval, there is no interlock
B. Correct answer
C. Alarm on low flow defeated when control switch is off
D. No interlocks associated with Post LOCA cavity purge

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
LSM-011	2	AREA RAD	072K4.01	3.3*/3.6*	NEW	MEMORY	BOTH

33". "Following a small steam leak in containment, one channel of containment pressure reads 4.0 psig, the remaining channels read 3.6 psig. The power supply for area radiation monitor RE-002 begins acting erratic and generates a HI alarm. What automatic action(s) will occur?

A. A safety injection will be initiated.

B. All 8 containment coolers will start in slow speed.

C. All 8 containment coolers will start in fast speed.

✓D. Containment ventilation will isolate.

D. LO-LP-29160, LO-4

A. Requires two containment pressure channels above 3.8

B. This does not auto start containment coolers

C. This does not auto start containment coolers

D. Correct answer

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
LSM 012	2	AREA RAD	072A2.01	2.7/2.9	NEW	COGN	RO

34". "Which one of the following is the color used to identify Instrument channel IV.

A. Brown

B. Green

C. Blue

✓D. Yellow

The only

D. **LOLP0110314C LO-4**

Channel I Brown
Channel II Green
Channel III Blue
Channel IV Yellow

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
LSM-004	1	AC LOADS	062K2.01	3.3/3.4	NEW	MEMORY	BOTH

Why in LP

35". "What supplies power to the control building MCC 2NBB ?

✓A. O/L 2X3D-AA-D04A

B. O/L 2X3D-AA-D02A

C. O/L 2X3D-AA-D05A

D. O/L 2X3D-AA-D01A

A.

provide electrical drawings, 1X3D-AA-A01A,1B
*** replace MCC reference with a component that is controlled from this MCC and provide drawing that show its power supply.

THIS QUESTION STILL NEEDS SOME WORK WE NEED TO GET A COMPONENT DOWNSTREAM OF THE MCC LISTED AND THEN PROVIDE THE DRAWINGS TO THE RO CANDIDATES DURING THE TEST.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
LSM-005	1	DC DIST	GEN 2.1.24	2.8/3.1	NEW	COMP	BOTH

The steam supply press 5%.

36". "~~The pressure in main steam supply header used as primary source of steam to Steam Jet Air~~ Ejector slowly drops by about 5 % due to a small steam leak. This causes a reduction in the effectiveness of the Steam Jet Air Ejector. As vacuum decreases:

✓A. Psat increases, Tsat increases, and enthalpy change across turbine decreases.

B. Psat decreases, Tsat decreases, and enthalpy change across turbine decreases.

C. Psat increases, Tsat increases, and enthalpy change across turbine increases.

D. Psat decreases, Tsat decreases, and enthalpy change across turbine increases.

A

A reduction in air removal causes the air and non condensible gas inventory in condenser to increase. This reduces efficiency which in turn causes the enthalpy across the turbine to decrease. Efficiency of turbine decreases as enthalpy change across turbine decreases. Less of the energy contained in the steam is converted to work - more is rejected as heat

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
LSM 001	2	CON AIR RE	055K3.01	2.5/2.7	NEW	COMP	RO

37". "What is the first indication that the Emergency Diesel Generator day tank level switch has failed high. (assuming no operator actions)

A. Excessive day tank auto makeup.

✓B. Day tank low level alarm.

C. Low fuel oil pressure alarm.

D. Fuel oil supply pressure regulating valve will fail-open.

B.LO-LP-11101-C LO-9

a. there will be no auto makeup

b. correct answer

c. caused by strainer/filter blockage

d. The low level alarm will annunciate first

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
LSM-006	2	EDG FUEL	064K6.08	3.2/3.3	NEW	ANALYSIS	BOTH

Memory?

Re license!

Okay ✓

38". "What automatic actions take place when the DPM self diagnosis detects a problem with RE-2562, Containment Atmosphere Particulate Iodine Gas Detector?

A. A high alarm signal to the SSPS is inhibited.

B. Only a trouble alarm is generated, no signal is sent to the SSPS.

C. A high alarm and trouble alarm will alarm simultaneously ; however, the actuation signal to the SSPS will be inhibited.

✓D. A high alarm is sent to the SSPS.

Review the LO

D. LO-LP-32101-30-C, LO-7

A. This is the case for ~~alarms~~ except this alarm LO-LP-32101-30, page 12

B. A high alarm signal is generated LO-LP-32101-30, page 12

C. his is the case for alarms except this alarm LO-LP-32101-30, page 12

D. Correct answer

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
LSM 013	2	PROCESS RA	073A2.02	2.7/3.2	NEW	COGN	BOTH

Not Operationally Oriented?

39". ~~"It is January 31." The ambient temperature is 27 degrees.~~ A condenser circulating water pump develops a slight vibration and it is determined that maintenance must be performed on the pump. You are directed to establish a Circulating Water Pump level of 29 to 31.5 feet, prior to stopping the pump. What is the basis for this action?

A. To ensure the remaining Circulating Water Pump has sufficient NPSH.

✓B. To prevent over flowing the Cooling Water Basin.

C. To allow the discharge permissive to be bypassed.

D. To minimize the buildup of ice on the cooling tower fill plates.

B. LO-LP-07101-24C
A. Not required for NPSH
B. Correct answer - LO-LP-07101-24C page 19
C. Required for an emergency stop. There are no conditions requiring an emergency stop.
D. This accomplished by riser flumes and is not directly effected by level.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
LSM 014	2	CIRC WATER	075A2.02	2.5/2.7*	NEW	COGN	BOTH

40". "There is a fire in the main control room. You enter 18038-1 "Operation from Remote Shutdown Panels." The Unit Shift Supervisor directs you to abandon the control room. Which one of the following are your immediate actions and which shutdown controls and instrumentation should you use once you leave the control room?

A. Trip the reactor, enter E-0, and use the controls and instrumentation on shutdown panel A.

B. Trip the reactor, do not enter E-0, and use the controls and instrumentation on shutdown panel A.

C. Trip the reactor, enter E-0, and use the controls and instrumentation on shutdown panel B.

✓D. Trip the reactor, do not enter E-0, and use the controls and instrumentation on shutdown panel B.

D. 18038-1

A. E-0 is not entered following abandonment of the control room. If the control room is evacuated due to a fire, Shutdown panel A controls and instrumentation may not be reliable.

B. If the control room is evacuated due to a fire, Shutdown panel A controls and instrumentation may not be reliable.

C. E-0 is not entered following abandonment of the control room.

D. correct answer

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
LSM-017	2	FIRE PROT	086K3.01	2.7/3.2	NEW	COGN	RO

41". "Unit 1 was shut down in Mode 5 for refueling when a fuel handling accident occurred in the refueling canal area. A spent fuel bundle was smashed into the side of the canal and a section of cladding was damaged. Given the following conditions:

Gamma radiation levels are 10R/hr at a distance of 10 ft from the bundle.
The refueling bridge area radiation monitor is 20 ft away from the suspended bundle.
Trip setpoints for the bridge area rad monitor is ______
A cloud of radioactive particulate gas surrounds the fuel handling bridge.
Beta radiation levels from this cloud are 25 R/hr.

What is the correct description of the alarm status of the refuel bridge radiation monitor and the containment evacuation alarm?

A. No alarms will be present on the radiation monitor and the containment evacuation alarm will not sound.

B. Radiation monitor will be in alert condition and the containment evacuation alarm will sound.

C. Radiation monitor will be in alert and the containment evacuation alarm will sound.

D. Radiation monitor will be in trip and containment evacuation alarm will sound.

Point source method Dose rate gamma = 10 * (10*10)/(20*20) = 2.5 R/hr
Line source method Dose rate gamma =10 * 10/20 = 5 R/hr

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
MS04	3	PRO RAD MO	073 K5.03	2.5/3.1		ANALYSIS	BOTH

42". "Unit 1 is operating at 50% power with normal operating equipment in service. Circulating water pump # 1 has just tripped due to a fault. Given the çurrent plant conditions what is the effect on the main condenser dT and efficiency?

	dT	Efficiency
A.	Increase	Increase
B.	Decrease	Increase
✓C.	Increase	Decrease
D.	Decrease	Decrease

C

Some how this question was written by MS and the KA should have been K1.02 vice A2.02. Will leave this as is.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
MS01	2	CIRC WATER	075 A2.02	2.5/2.7		ANALYSIS	BOTH

43". "Unit 1 is shutdown for a refueling outage. A station air header rupture occurs and the station air system completely depressurizes. Valve PV-9375 was open at the time of the rupture. What effect does a total loss of the station air system have on the instrument air system?

A. Valve PV-9375 will auto-close as instrument header pressure decreases below 100 psig and the air compressor # 3 will start automatically to maintain air header pressure.

B. Valve PV-9375 will auto-close as instrument header pressure decreases below 80 psig and the swing ~~station~~ air compressor must be manually started to maintain ~~station air header~~ swing pressure.

C. Valve PV-9375 will auto-close as INST air header pressure decreases below 80 psig and the station air compressor ~~#3~~ will operate to maintain instrument header pressure. w STANDBY

D. Station air header will completely depressurize. ADD few words

Changes

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
MS02	2	AIR SYSTEM	079 A.401	2.7/2.7		ANALYSIS	BOTH

44". "Unit 1 is operating at 8% power and preparing continue the increase load after a startup. Which one of the following conditions/signals will generate a Direct a main turbine trip signal and a ~~Secondary reactor trip signal?~~ directly

✓A. # 1 S/G level = 87%.

B. Pressurizer Pressure = 1945 psig.

PRZ level ≥ 90%

C. ~~ETS Hydraulic pressure at 560 psig.~~

D. Loss of the # 1 and # 3 RCPs.

10CFR55-41.7

Reference: LO-LP-28103, RPS and ESF Signals,

Distractor Analysis.

a. Answer.
b. Provides Reactor Trip but no turbine trip. Below P-7
c. Reactor power is below P-9, (50% reactor power) which is required for the turbine trip.
d. Causes a reactor trip but no turbine trip. Below P-7

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
RSB05	2	MTG RPS	045 K4.11	3.6/3.9	NEW	ANALYSIS	RO

45". "Spent Fuel is being loaded into a shipping cask located in the cask loading pit using the fuel handling machine and the spent fuel handling tool. The cask cover has been placed on the shipping cast. Upon movement of the cask to the cask washdown area the cask slips out of the spent fuel cask crane main hoist and falls to the floor. The following alarms/information are reported to the control room:

Radiation alarms in the Fuel Handling building. XXXXXX
Report of the dropped cask with the top open.

Which one of the following is the FIRST action mandated by 18006-C, "Fuel Handling Event?"

A. Announce on the Public Address System to evacuate the Fuel Handling Building.

B. Notify HP to survey personnel involved.

✓C. Suspend any movement currently in progress.

D. Notify the Unit Shift Supervisor and Reactor Engineering.

CFR 41.5, 43.5, 45.5, 45.13
Reference: 18006-C. "Fuel Handling Event"

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
RSB08	2	DROP CASK	034 A2.02	3.4/3.9	NEW	MEMORY	BOTH

46". "Unit 1 is responding to a LOCA. A safety injection occurred at 0200. Given the following conditions inside containment:

	0200	0210	0220	0230
Containment pressure (psig)	3.0	4.1	3.9	3.8

At what time doe the reactor coolant pumps and motors lose component cooling water and nuclear service cooling water flow and what is the earliest time the operators can restore cooling flow by using reset buttons?

	Lost cooling flow	Able to regain cooling flow
A.	0200	0200
B.	0200	0230
✓C.	0210	0210
D.	0210	0220

C

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
MS03	2	SVCS WTR	076 K1.01	4.3/3.3	?	ANALYSIS	RO

New Q

48". "In accordance with 10004-C, "Shift Relief," when they have completed shift relief and assumed the duties of their position non-licensed operators shall:

A. Review narrative logs, round sheets and check list for his station.

✓B. Make a report to the control room.

C. Discuss relevant items affecting plant operations with off-going counterpart.

D. Initiate a complete set of system logs for their watch station.

B. 10004-C, step 3.10a
A. Required prior to assuming shift
B. Correct answer
C. Required prior to assuming shift
D. Not required following assumption of shift

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
LSM-018	2	TURNOVER	2.1.3	3.0/3.4	NEW	MEMORY	BOTH

50". "Following entry of an LCO if a subsequent train, subsystem, component, or variable expressed in the Condition is discovered to be inoperable or not within limits, the Completion Time(s) may be extended. To apply this Completion Time extension what criteria must be met?

The subsequent inoperability: Must exist concurrent with the first inoperability;

✓A. and Must remain inoperable or NOT within limits after the first inoperability is resolved.

B. and Must NOT remain inoperable or NOT within limits after the first inoperability is resolved.

C. and Must NOT remain inoperable or be within limits before the first inoperability is resolved.

D. and Must remain inoperable or be within limits before the first inoperability is resolved.

TS 1.3 LCO completion time, LO-LP-39201-C, LO-LP-39202-11-C, page 21
A. correct answer
B. Must remain inoperable after the first inoperability is resolved.
C. Must remain inoperable or not within limits after the first inoperability is resolved.
D. Must remain not within limits after the first inoperability is resolved.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
LSM-020	2	TS ENTRY	G 2.1.33	3.4/4.0	NEW	ANALYSIS	RO

51". "Engineering has developed a graph of VCT level versus VCT pressure that will be used as an operator aid. Which one of the following positions represents the MINIMUM level of approval for posting this as an operator aid?

A. An individual holding a Senior Reactor Operator license.

✓B. Shift Supervisor

C. Manager of Operations

D. Plant Manager

REF: LO-LP-63509-05, page 4

ME wrote this question and replaces KA Cat 1 2.1.6, this KA is 2.1.1

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
ME18	2	COND OPS.	G 2.1.1	3.7/3.8	NEW	MEMORY	SRO

52". "Why is the differential temperature between the pressurizer steam space and the loop 4 hot leg maintained less than 320 degrees F during unit heatup?

A. Ensures there is adequate driving force for pressurizer spray.

B. Ensures adequately NPSH for the start of the loop 4 RCP.

✓C. Ensures a reduction in the number of thermal cycles on the system.

D. Ensures the RCS is isothermal for a uniform heatup.

C. LO-LP-61209-13-C page 6 learning objective 6
A. Would require a minimum temperature, not a maximum one
B. Would not necessarily ensure adequate NPSH
C. Correct answer
D. This the reason at least on RCP should be running above 160 degrees F

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
LSM-021	2	PRE-START	GEN 2.2.1	3.7/3.6	NEW	MEMORY	RO

53". "During Refueling operations the Reactor Operator:

A. Makes final decision concerning deviations from fuel loading sequence or assembly substitutions.

B. May perform as second person who verifies correct manipulation of fuel assemblies and fuel inserts.

C. Responsible for signing Fuel Handling Data Sheets.

✓D. Directs disengagement of fuel bundles in the core.

D. LO-LP-25201-20-C learning objective 3d
A. Reactor Engineer performs this function
B. Fuel Handling Coordinator performs this function
C. Fuel Handling Supervisor performs this function
D. Correct answer

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
LSM-022	2	FUEL HANDL	G 2.2.30	3.5/3.3	NEW	COGN	RO

54". "A Unit 1 Refueling outage was scheduled to begin on December 16th. The following are the sequence of events as they took place:

-12/16 / 0900	Turbine tripped, breaker open
-12/16 / 1030	Mode 2 entered
-12/16 / 1200	Mode 3 entered
-12/16 / 1400	All rods in

Which one of the following is the earliest time the movement of fuel in the reactor vessel can commence?

A. 12/18 / 1100

B. 12/19 / 1300

✓C. 12/20 / 1300

D. 12/21 / 1100

Technical Requirements Manual TR 13.9.1 Decay Time 100 hours subcritical

A. 50 hours
B. 74 hours
C. 100 hours
D. 122 hours

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
RSB10	2	REFUELING	G 2.2.26	2.5/3.7	STL NEW	ANALYSIS	SRO

55". "During core off-load, the refueling team identifies that refueling cavity level is decreasing in an uncontrolled manner. RWST level is 30%. Which one of the following identifies the PRIORITY of aligning a makeup flowpath?

✓A. Gravity drain from the RWST.

B. Gravity drain from the RMWST.

C. Demineralized Water system.

D. Fire Protection System.

LO-LP-25102-26-C p. 17, Learning Objective # 8
LO-LP-60322-06, p 5, Learning Objective #3.
AOP- 18030,p 2
SOP 13719, Spent Fuel Pool Cooling and Purification System.
Changed the KA from 2.2.29 to 2.2.28. Question from the North Anna 1998 examination.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
RSB14	2	SFP MKUP	G 2.2.28	2.6/3.5	NEW NA	MEMORY	SRO

56". "You are making rounds in the Auxiliary Building when you come to a room posted "Locked High Radiation Area." Which one of the following describes the minimum additional requirements needed to enter the room?

A. RWP/SRWP only.

B. RWP/SRWP and a survey instrument.

C. RWP/SRWP, survey instrument and an alarming dosimeter.

✓D. RWP/SRWP, survey instrument, and an HP technician.

Reference: LO-LP-63930-09, p. 11
Learning Objective # 6. State the requirements applicable to each of the following: Locked High Radiation Area.
Summer question # 65 used 1999.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
RSB07	2	RADIATION	G 2.3.10	2.9/3.3	SUMMER/NEW	MEMORY	RO

57". "Given the following Unit 1 plant conditions:

-The plant is in Mode 6.
-Refueling operations are in progress.
-A Containment -Purge is in progress.
-Annunciator on ALB-05 on the Main Control Board, alarms Radiation Monitor Trouble.
-The Balance of Plant Operator (BOP) reports a magenta colored light on 1-RE-12442C.

Which one of the following describes the appropriate response to this situation?

✓A. Refueling Operations may continue and the Containment Purge may continue as long as 1-RE-12444C remains operable.

B. Refueling Operations may continue and the Containment Purge may continue as long as 1-RE-12444C remains operable and 1-RE-12442C is returned to service within 4 hours.

C. Immediately close the Containment Purge supply and exhaust valves. Refueling Operations must be suspended until 1-RE-12442C is returned to service.

D. Immediately close the Containment Purge supply and exhaust valves. Refueling may continue.

New question
SRO only
Answer: A

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
RSB08	3	RADIATION	G 2.3.9	2.5/3.4	NEW	ANALYSIS	SRO

58". "Which of the following conditions would require an ALARA Pre-Job Brief review?

A. Work area dose rate of 95 mrem/hour with an exposure estimate of 0.5 person-rem.

✓B. Removable contamination levels of 1,500,000 dpm/100 cm2.

C. Airborne radioactivity at 0.25 Derived Air Concentrations (DACs) for particles and iodines.

D. Airborne radioactivity of 0.5 Derived Air Concentrations (DACs) for noble gasses.

Reference: VEGP ALARA Program 09010-C, section 4.2.2

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
RSB11	2	ALARA	G 2.3.2	2.5/2.9	NEW	MEMORY	SRO

New

59". "In accordance with plant Technical Specifications which one of the following represents the storage configuration of 5.0 weight percent new or partially spent fuel assemblies for Unit 1 and Unit 2?

	Unit 1	Unit 2
A.	3 out of 4	3 out of 3
B.	3 out of 3	2 out of 4
✓C.	3 out of 4	2 out of 4
D.	2 out of 4	3 out of 3

Reference: Technical Specifications Unit 1, 4.3.1.1
Unit 2, 4.3.1.2

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
RSB13	2	UNIT DIFF	G 2.3.8	3.1/3.3	NEW	MEMORY	SRO

60". "A plant procedure is not marked to indicate if it is "Reference Use" or "Continuous Use". Which one of the following represents the required method for implementing this procedure?

A. The procedure must be open and readily available. The operator does NOT need to follow it step by step, but he is accountable for successful task completion.

B. The procedure does NOT need to be open and readily available. The operator does NOT need to follow it step by step, but he is accountable for successful task completion.

✓C. The procedure must be open and readily available. The operator must follow it step by step.

D. This is an example of an "Incorrect Procedure" and must be reported to the Shift Supervisor prior to continuing.

REF: 00054-C, Rules for Performing Procedures, pages 2

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
ME17	2	COND OPS.	G 2.1.20	4.3/4.2	NEW	MEMORY	SRO

62". "During a declared "GENERAL EMERGENCY" you volunteer to perform an action to minimize equipment damage. While briefing with the Dose Assessment Manager, you are informed you will exceed your normal exposure limits.

Which one of the following individuals can approve use of Emergency Exposure limits?

A. EOF Manager.
B. Dose Assessment Manager.
C. Accident Unit SRO.
✓D. Emergency Director.

D. Emergency Response Organization 91101-C, p. 8

A. Dose Assessment Manager Reports to the EOF manager.
B. Highest level Health Physics representative on site.
C. Accident Unit SRO has the most knowledge of integrated
D. Answer

This KA was changed from 2.3.11 to 2.3.4.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
RSB 17	2		G 2.3.4	2.5/3.1	NEW	MEMORY	RO

63". "The plant has experienced a large break LOCA. The crew has transitioned from 19000-C, "E-0 Reactor Trip or Safety Injection," to 10910-C, "E-1 Loss of Reactor or Seconday Coolant." The following conditions exist:

AFW

- "A" S/G N/R level is 31%, EFW flow is 120 gpm.
- "B" S/G N/R level is 24%, EFW flow is 110 gpm.
- "C" S/G N/R level is 29%, EFW flow is 110 gpm.
- "D" S/G N/R level is 30%, EFW flow is 110 gpm.
- S/G pressure in all S/Gs 1035 psig.
- RCS pressure is 100 psig and decreasing.
- NO RCPs are running
- Core Exit T/C are 705 degrees F.
- RVLIS ~~Narrow~~ Full Range Level is 53%.
- Containment pressure is 37 psig.

Using the attached procedure what is the correct procedure to use for these conditions?

A. Transition to 19223-C, "FR-C.3, Response to Saturated Core Cooling."

✓B. Transition to 19231-C, "FR-H.1, Response to Loss of Secondary Heat Sink."

C. Transition to 19235-C, "FR-H.5, Response to Steam Generator Low Level."

D. Transition to 19251-C, "FR-Z.1, Response to High Containment Pressure."

Reference: 19200-C, "F-0, Critical Safety Function Status Trees" p. 7

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
RSB09	3	PROCED GEN	G 2.4.21	3.7/4.3	SUMMER/NEW	ANALYSIS	RO

64". "Unit 1 has just completed a shutdown to mode 5 with both RHR trains in service. Which one of the following statements is correct regarding an adequate reactor coolant vent path into containment to mitigate the consequences of a loss of RHR cooling?

A. An open reactor head vent will provide and adequate vent path in mode 5.

B. An open S/G cold leg manway with the hot leg nozzle dam installed, and the cold leg nozzle dam not installed will provide an adequate vent path.

✓C. An open S/G hot leg manway with the hot leg nozzle dam not installed will provide and adequate vent path.

D. An adequate vent path is not required until the reactor head is removed in mode 6.

References:
18109-C, "Loss of Residual Heat Removal" Attachment A, p. 29
12008-C, "Mid Loop Operations", p. 5
LO-LP-60315-12-C p. 32
See Catawba question 337

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
RSB12	2	SHUTDN COL	G 2.4.9	3.3/3.9	NEW/CATAWB	ANALYSIS	SRO

65". "Which one of the following conditions would require the Reactor Operator to shut the main steamline isolation valves following a reactor trip as an Immdediate Operator Action in accordance with 19100-C, "Loss of all AC Power?"

A. The turbine control valves do not close when the turbine trips.

B. Steam line pressure on the #1 Steam line decreased to 578 psig.

✓C. The turbine stop valves do not close and the turbine could not be run back.

D. The cause of the trip was a sustained loss of all 4160 AC IE buses.

Reference: 19100-C, Loss of All AC Power p.1 Immediate Operator Action
19000-C, Reactor Trip or Safety Injection.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
RSB15	2	EOP ENTRY	G 2.4.1	4.3/4.6	NEW	ANALYSIS	SRO

New Item

66". "A main control room Fire Alarm Computer (FAC) sounds. You respond to an unconfirmed fire alarm by depressing the ALARM SILENCE button and the Red ACK key until the alarm silences. You dispatch personnel and their investigation reveals that there is no fire. The alarm sounds once again and once again you depress the ALARM SILENCE button and the Red ACK key until the alarm silences. You determine that the alarm is a nuisance alarm and direct the appropriate compensatory fire watches. The alarm continues to sound. You issue a maintenance work order to have the cause investigated. The instrument technicians determine there is an instrument loop malfunction caused by the annunciator card. The required parts will take at least 96 hours to obtain. What actions can you take to disable the alarm before the replacement part is secured?

A. Follow procedure 00304C, "Equipment Clearance and Tagging", and have the annunciator disabled by removing it's cards.

B. Follow procedure 00307C, "Temporary Modifications", Issue a temporary modification to disable the annunciator by removing it's cards.

✓C. Have the Unit SS authorize the annunciator's cards be removed.
Complete an ENG Evaluation card

D. Issue an additional maintenance work order to have the annunciator cards removed.

C. LO-LP-63518C LO-01

A. - Disabling annunciators inputs by other than pulling cards is controlled by 00304C "equipment clearance and tagging"

B. - Disabling annunciators inputs by other than pulling cards is controlled by 00307C "Temporary Modifications"

C. - Correct answer

D. - can be issued to remove and replace card

KA GEN 2.4.10, Knowledge of Annunciator response procedures (3.0/3.1)

Level 2 - comp

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
LSM 023	2	ARP PROCED	G 2.4.10	3.0/3.1	NEW	COMP	RO

67". "Post Accident Monitoring (PAM) instrumentation ensures the operability of Regulatory Guide 1.97 Type A Category 1 variables so the control room operating staff can perform the diagnosis specified in the emergency operating procedures;

✓A. However, these variables are restricted to preplanned actions for the primary success path of DBAs only.

B. However, these variables are restricted to preplanned actions for the primary success path of EOPs only.

C. However, these variables are restricted to preplanned actions for the primary and alternate success path of EOPs and AOPs only.

D. However, these variables are restricted to preplanned actions for the primary and alternate success path of DBAs only.

A: Technical Specification Basis 3.3.3-2 LO-LP-37003-09-C page 4.c and 6
Notes:
A. Correct answer
B. first bullet in safety analysis states : these variables are restricted to preplanned actions for the primary success path of DBAs only. EOPs are beyond design basis
C. first bullet in safety analysis states : these variables are restricted to preplanned actions for the primary success path of DBAs only. EOPs are beyond design basis
D. first bullet in safety analysis states : these variables are restricted to preplanned actions for the primary success path of DBAs only. This is restricted to AER (primary path) only

LSM - 024 KA gen 2.4.3 Ability to identify post accident instrumentation (3.5/3.8)

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
LSM 024	2	REG GUIDE	G 2.4.3	3.5/3.8	NEW		RO

(PTS)

68". "Procedure 19241, "Response to Imminent Pressurized Thermal Shock," is used to avoid/limit PTS or thermal shock to the reactor vessel. Which ONE of the following can this procedure also be used for?

A. to respond to a limited overcooling condition.

✓B. to avoid/limit overpressure conditions at low temperature.

C. to avoid/limit loss of secondary heat sink.

D. to avoid/limit degraded core cooling.

b

EB# LO-LP-37071-05-01

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM61	MEMORY	1/1	1/1	CE/A11	EK2.2	3.6/4.9	N/A

69". "The loop 3 narrow range cold leg RTD fails high while at 100% power. Which ONE of the following describes how loop 3 Delta T indication will react?

A. increases

✓B. decreases

C. remains the same

D. decreases off scale low

b

Q 43 of 95 RO exam

Option D changed from "Not enough information given? 11/12/99

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM06	ANALYSIS	2/2	2/2	002	K5.12	3.7/3.9	VG95

70". "Given the following information:

- Unit 1 is entering MODE 4
- RHR train "A" and CCP "A" are in service
- Various train "A" CCW annunciators are in alarm
- All train "A" CCW pumps are running with discharge pressure at 75 psig
- CCW train "A" surge tank level is decreasing
- The crew enters AOP 18020-C, "Loss of CCW"

Which ONE of the following is the correct action to take per 18020-C?

A. Place CCW train "A" in single pump operation after verifying that NSCW train "A" is in service.

B. Stop CCW train "A" pumps and place non-affected CCP "B" in service after verifying that CCW Train "B" is in service.

C. Stop CCW train "A" pumps and stop train "A" NSCW pumps after verifying that CCW train "B" is in service.

✓D. Stop CCW train "A" pumps and place non-affected RHR train "B" in service after verifying that CCW train "B" is in service.

d

95 SRO exam Q 66

Licensee included AOP with exam

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM09	COMP	2/3	2/3	008	A2.02	3.2/3.5	VG95

71". "Based on the following plant conditions and sequence of events:

- Unit 1 is operating at 60% power
- The operators are responding to a transient that caused letdown to isolate
- The RO is attempting to restore normal charging and letdown to service

Which ONE of the following statements correctly describes the operation of the letdown orifice isolation valves?

The letdown orifice isolation valves:

A. close automatically on a letdown isolation.

B. close when any pressurizer level channel lowers to <25%.

C. must be ~~closed~~ opened before the letdown isolation valves can be ~~opened or~~ closed. only

D. must be opened before the letdown isolation valves can be opened only.

C

EB# LO-LP-09101-03-14

Modify distractors A&B

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM10	MEMORY	2/2	2/2	011	A4.05	3.2/2.9	N/A

72". "The normal full open pressure setpoint for the pressurizer spray valves is:

A. 2260 psig

✓B. 2310 psig

C. 2315 psig

D. 2330 psig

b

EB# LO-LP-16303-03-12 (#246)

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM08	MEMORY	2/2	2/2	010	A4.01	3.7/3.5	N/A

73". "Containment spray is operating (and is required) after a large break LOCA in containment. Cold leg recirculation alignment per 19013, "Transfer to Cold Leg Recirculation," for the ECCS pumps has been performed. The "RWST Empty" alarm is received and you verify RWST level is 9% and decreasing. Which ONE of the following actions should you perform?

A. Stop the containment spray pumps when RWST level is less than 5% if auto swapover to sump suction did not occur at the 9% RWST level.

B. Minimize containment spray flow by stopping one of the containment spray pumps after verifying at least 4 containment coolers are running in slow speed. When RWST level lowers to less than 5%, stop the remaining pump.

✓C. Realign the containment spray suction to the containment sump while allowing the pumps to continue to run.

D. Stop the containment spray pumps, realign containment spray suction to the containment sump, then restart the containment spray pumps.

C

95 RO exam, # 44. May not be close enough to ECCS. Consider modifying or replacing. OK the way it is. No change is necessary.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM07	ANALYSIS	2/2	2/2	006	A4.07	4.4/4.4	VG95

74". "With Unit 1 at 100% power, the RO takes the following data from the power range NIs. Assume the normalization factor for all detectors is 1.0.

Detector	N-41	N-42	N-43	N-44
Upper	337	360	367	355
Lower	370	360	365	360

Which ONE of the following is correct?

A. QPTR is 1.017

B. QPTR is 1.028

✓C. QPTR is 1.034

D. QPTR is 1.062

C

Q 36 of 95 RO exam

Requires knowledge of the definition of QPTR per TS. Licensee did not include procedure with exam.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM01	ANALYSIS	2/1	2/1	001	A3.04	3.5/3.8	VG95

75". "An unisolable break inside reactor containment has occurred on #3 main steam line. All MSIVs and their bypasses have closed, and the #3 SG has finished depressurizing and is equalized with containment. All intact SGs are pressurized and stable at 900 psig and SG#3 pressure instruments all show 20 psig.

Which ONE of the following is true regarding clearing the SLI signal so the MSIVs on the unaffected loops can be reopened?

A. SI must be first reset before SLI to enable reopening of the MSIVs and bypasses.

B. Resetting only SLI will allow the valves to be reopened.

C. Low steam line pressure SLI signal of 585 psig on the faulted SG would have to be blocked before the resetting of SLI would allow reopening of the MSIVs and bypasses.

✓D. SLI cannot be reset under the present conditions without using bypass test instrumentation switches.

d
EB# LO-LP-28103-07-08 (#147)
LO-LP-28101
Note - while "d" is technically correct, could not find a reference to performing this action in EOPs or other procedures. Using this option would inhibit future SLI actuations. Verify that this can actually be accomplished (e.g. if keys are required, are enough keys provided in control room?) and that there is some procedural basis for doing it.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM11	MEMORY	2/1	2/1	013	5.02	2.9/3.3	N/A

76". "Given the following conditions:

- Unit 2 is at 100% power
- CCP "A" is in service providing normal charging flow
- An inadvertent "B" train SI was generated by I&C
- "A" train SI signal is NOT present
- No operator action has been taken

Correct

Which ONE of the following is correct?

A. Normal mini-flow path for both CCPs is isolated, CCP "A" alternate mini-flow path is isolated, CCP "B" alternate mini-flow is available.

B. CCP "A" normal mini-flow path is available, CCP "A" alternate mini-flow path is isolated, CCP "B" alternate mini-flow path is available.

C. Normal mini-flow path for both CCPs isolated, alternate mini-flow path for both CCPs is available.

D. Normal mini-flow paths for both CCPs isolated, alternate mini-flow paths for both CCPs isolated.

C

EB# LO-LP-09202-01-05 (#94)

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM05	COMP	2/1	2/1	004	A2.12	4.1/4.3	N/A

77". "Unit 2 is in MODE 3 at 557 degrees and 2235 psig when a fault condition results in the loss of the 2NAB 13.8KV bus. In order to stabilize RCS pressure, the RO manually energizes the available backup heaters and attempts to control RCS pressure by manually operating the pressurizer spray valves. Which ONE of the following statements best describes the required control board actions necessary to stabilize pressure?

A. Loop 1 spray valve, PV-455C, should be manually closed and loop 4 spray valve, PV-455B, must be used to control pressure.

✓B. Loop 4 spray valve, PV-455B, should be manually closed and loop 1 spray valve, PV-455C, must be used to control pressure.

C. The backup heaters should be deenergized because neither Loop 1 spray valve, PV-455C, nor Loop 4 spray valve, PV-455B, will be effective in controlling RCS pressure.

D. Either spray valve may be used to control pressure.

b

EB# LO-LP-16301-06-05 (#184)

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM03	ANALYSIS	2/1	2/1	003	K2.01	3.1/3.1	N/A

78". "Which ONE of the following is an indication of an RCP #1 seal failure?

A. Affected RCP #1 seal delta P increase.

✓B. Affected RCP #1 seal leakoff increase.

C. Excess letdown header pressure decrease.

D. Affected RCP seal injection flow decrease.

b

Q 37 of 95 RO exam

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM02	COMP	2/1	2/1	003	A1.09	COMP	VG95

79". "Given the following information:

- Rod bank selector switch in manual
- The in-hold-out switch is held in the "IN" position until the step counters count 5 steps IN
- DRPI indication does not change

Which ONE of the following statements is true?

A. Rods definitely moved inward as indicated by the step counter change even though DRPI did not indicate rods moved.

B. Since rods did not move when 4 steps of rod movement was demanded, AOP 180003-C, "Rod Control System Malfunction," must be entered.

✓C. Rods probably moved inward as indicated by the step counter change. Rods will have to move in another step before DRPI indication will change.

D. Since DRPI indication did not change as expected when 4 steps of rod movement was demanded, operations should perform the control rod operability surveillance test.

C

EB# LO-LP-27201-03-02

95 RO exam Q 42

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM13	COMP	2/2	2/1	014	K5.01	2.7/3.0	VG95

81". "Unit 1 is critical in MODE 2 below the P-6 interlock when BOTH Source Range Nuclear Instrumentation channels fail. What immediate actions are required by Technical Specifications?

A. Immediately stabilize power and verify that power is indicated by two channels of Intermediate Range Nuclear Instrumentation.

B. Immediately suspend operations involving the addition of positive reactivity until one Source Range Nuclear Instrumentation channel is returned to service.

✓C. Immediately open the reactor trip breakers.

D. Initiate actions within 1 hour to be MODE 3 within 7 hours.

C

new question 11/1/99
Ref: TS 3.3.1

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM15	MEMORY	2/1	2/1	015	2.1.11	3.0/3.8	N/A

82". "The following indications exist in the control room with the unit at 45% power, all control systems are in AUTO:

- TAVG/TREF DEVIATION annunciator
- AMSAC TROUBLE annunciator
- TURB PWR P13 CHII PB-506A status light illuminated (CHI PB-505A off)

The FIRST action required of the operator in accordance with the appropriate AOP is:

✓A. Verify no rod motion.

B. Verify a runback is required.

C. Check no runback is in progress.

D. Place rods in MANUAL.

a

EB# LO-LP-60301-19-03, p. 26

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM16	COMP	2/2	2/2	016	A2.03	3.0/3.3*	N/A

83". "Given the following conditions:

- A large break LOCA has occurred 3 hours ago on Unit 1
- Containment pressure is 46 psig
- Continment H2 concentration is 5% per the H2 monitors
- DG1A is supplying 1AA02

Which ONE of the following is correct concerning post-accident hydrogen control using the attached procedure 13130-C, "Post Accident Hydrogen Control?"

A. Dilute the containment hydrogen concentration using the service air system.

✓B. The "A" train post-LOCA electric hydrogen recombiner can be placed in service if 1AA02 bus loading is monitored.

C. The "A" train post-LOCA electric hydrogen recombiner can NOT be placed in service due to DG1A carrying the 1AA02 bus.

D. The hydrogen monitors are unreliable at this point. Three more hours must pass and another hydrogen sample taken.

b

EB# LO-LP-29110-03-05

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM17	COMP	2/3	2/2	028	A2.02	3.5/3.9	VG 95

84". "With the plant operating at 70% power, a significant leak develops in the variable leg of the channel #1 S/G level detector which is selected for S/G water level control.

If NO operator action is taken, which ONE of the following statements correctly describes one of the effects on the affected steam generator?

✓A. Loop 1 feed regulating valve will open.

B. Steam flow will initially be higher than feed flow.

C. Level will equalize at some value significantly lower than original.

D. Indicated steam generator level will increase on the affected channel.

a

EB# LO-LP-18501-10-08

T/13A-35, REV, D/1X4DB168, REV 11, P/13615-1, REV 3

Verify this response on the Simulator

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM19	ANALYSIS	2/2	2/2	035	K6.03	3.4/3.9	N/A

85". "Given the following conditions on Unit 1:

- Unit 1 at 14% reactor power after a trip from 320 days on line
- Rod control in manual
- Main turbine rollup completed at 1800 rpm
- MFP A operating with all BFRVs in AUTO
- RCS Tavg is at 561.5 degrees F.
- Steam dump pressure controller PIC-507 in AUTO

If main steam line pressure transmitter PT-507 fails high, which one of the following is CORRECT?

A. All steam dumps remain closed.

B. Steam header pressure cannot be controlled in the steam pressure mode and the main turbine must be tripped.

C. All of the steam dumps fully open, the reactor trips, and a safety injection occurs.

✓D. All steam dumps fully open and RCS cooldown stops at 550 degrees F.

d
EB# LO-LP-21201-08-04
O/PTDB, Tab 3.0
Distractors modified, removing reasons for actions.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM20	ANALYSIS	2/2	2/2	039	A2.04	3.4/3.7	N/A

86". "Given the following sequence of events:

- A reactor trip occurred on Unit 1 causing levels in all S/Gs to drop to between 33 and 36%, narrow range
- All AFW pumps start with discharge valves full open
- The BOP throttles AFW flow to 10% open position on all discharge valves
- Level has returned to 60-70% ~~NR level~~ in all S/Gs 10 min after Trip
- Both MFPs trip

Which ONE of the following states the position of the discharge valves if left unattended for 5 minutes?

A. The MDAFW and the TDAFW discharge valve positions would not change.

✓B. The TDAFW valves would stay as they are and the MDAFW valves would stroke full open.

C. The MDAFW valves would stay as they are and the TDAFW valves would stroke full open.

D. The MDAFW and TDAFW valves would stroke to full open position.

b

95 VG SRO exam #29

LO-LP-20101-04-05

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM21	ANALYSIS	2/1	2/1	061	K1.01	3.4/3.7	VG95

Valve Position - TD extension removed

87". "Which ONE of the following conditions describes a loss of containment integrity, as defined in Technical Specifications?

✓A. Both containment air lock doors are blocked open for maintenance in MODE 4.

B. The leakage rate of a containment penetration exceeds technical specification limits in Mode 5.

C. The outer containment airlock door is opened for normal transit while in MODE 2.

D. The inner containment airlock door is left open while performing maintenance on its "O" rings in Mode 3.

a
VG 95 SRO exam #75
LO-LP-39210-01-01
This is the same as ME16 Will have to replace ME 16

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM24	COMP	2/3	2/2	103	2.1.12	3.4/4.1	VG95

Delete
Replace

88". "Given the following information:

- Unit 1 is in Mode 4 with RHR train "A" in service
- RHR Pump "B" is out of service for maintenance
- The "B" train of SFPC is in service
- CCW TRAIN A SURGE TK HI/LO LVL annunciator is received and it is confirmed that surge tank level is increasing
- RE-017A, CCW train "A" radiation monitor, indicates increasing radiation levels in the CCW system

Which ONE of the following most correctly describes the cause and operator response for the plant conditions above?

A. The "A" RHR pump seal cooler has developed a leak. CCW can be isolated to the seal cooler so long as RHR temperature does not exceed 150 degrees.

✓B. The "A" RHR heat exchanger has developed a tube leak. The "A" train of RHR must be shut down and AOP 18019-C, "Loss of Residual Heat Removal," must be entered.

C. The "A" RHR heat exchanger has developed a tube leak. The "A" train of CCW must be shut down; however, operation of the "A" train of RHR may continue.

D. The "A" CCW heat exchanger has developed a tube leak. Operation of the "A" train of CCW may continue.

b
New Q 11/2/99
LO-LP-10101
LO-LP-12101
AOP 18019-C

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM60	ANALYSIS	2/3	2/3	005	K6.03	2.5/2.6	N/A

89". "A power operated relief valve fails open while Unit 1 is at 100% power. The common relief valve inlet pipe to the PRT fails at a flange immediately upstream of the PRT, with the ends offset by one pipe diameter. What ONE pair of indications below best corresponds to this event? one of the following

A. PRT pressure increasing, containment radiation levels increasing.

B. PRT pressure increasing, containment radiation levels constant.

✓C. PRT pressure decreasing, containment radiation levels increasing.

D. PRT pressure decreasing, containment radiation levels constant.

c

new Q 11/2/99
LO-LP-16301
DWG 1X4DB112

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM25	ANALYSIS	2/3	2/3	007	K3.01	3.3/3.6	N/A

90". "Unit 1 is operating at 100% power when the following parameters are noted:

- "RCP LOOP 1 LOW FLOW ALERT" annunciator is received
- Reactor coolant loop 1 flow indicator 1-FI-0414 indicates 100%
- Reactor coolant loop 1 flow indicator 1-FI-0415 indicates 100%
- Reactor coolant loop 1 flow indicator 1-FI-0416 indicates 100%
- Bistable FB414A (7300 NSSS channel I) has tripped
- Tavg, and loop delta T are normal for 100% reactor power

Which ONE of the following is the most probable cause for the alarm condition and what are the operational implications?

A. At least two loop 1 flow indicators have failed as-is while loop flow has reduced to at least 90%. 18005-C, "Partial Loss of Flow," must be entered.

B. At least two loop 1 flow indicators have failed as-is while loop flow has reduced to at least 90%. 18001-C, "Primary Systems Instrument Malfunction," must be entered.

C. Bistable FB414A has malfunctioned. The affected channel may be bypassed indefinitely while repairs are made, however, the loop 1 low flow trip is now subject to a 2-out-of-2 trip logic on the remaining low flow channels.

✓D. Bistable FB414A has malfunctioned. Operations may continue indefinitely, however, the loop 1 low flow trip is now subject to a 1-out-of-2 trip logic on the remaining low flow channels.

d
New question 11/3/99.
LO-LP-60301
17012-1, pg 5 of 39
13509-C

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM26	ANALYSIS	2/2	2/2	012	A2.01	3.1/3.6	N/A

91". "A failure or malfunction of the ESF sequencers which results in delays in the energizing ESF components can have which ONE of the following effects on the fuel during a large-break LOCA?

A. Cladding failure can occur as the core experiences an uncontrolled cooling due to vaporization of reactor coolant.

✓B. Structural integrity can be lost as delayed cooling can lead to fuel temperatures in excess of ECCS acceptance criteria, resulting in excessive clad oxidation and weakening.

C. Minimal effects will be seen as reflux cooling is sufficient to cool the core for up to ten minutes after the onset of a large break LOCA.

D. A natural circulation cooldown of the fuel can be adversely impacted due to excessive reactor coolant blowdown.

b

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM27	COMP	2/1	2/1	013	K3.01	4.4/4.7	N/A

92". "Which ONE of the following best describes the incore thermocouple data reasonability limits established by the incore thermocouple program of the integrated plant computer?

✓A. The low temperature reasonability limit is based upon cold leg temperatures and the high temperature reasonability limit is based upon saturation temperature for average RCS pressure.

B. The low temperature reasonability limit is based upon cold leg temperatures and the high temperature reasonability limit is a function of reactor power.

C. The low temperature reasonability limit is based upon main feedwater temperature and the high temperature reasonability limit is based upon saturation temperature for average RCS pressure.

D. The low temperature reasonability limit is based upon main feedwater temperature and the high temperature reasonability limit is a function of reactor power.

a

New Q 11/8/99

LO-LP-05210-18-C, II.B.2.j.3

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM29	MEMORY	2/2	2/2	016	K1.01	3.2*/3.2*	N/A

Not Applicable

Not required knowledge

~~Reword~~

New D

93". "Subcooling margin, as calculated by the plant safety monitoring system, is defined as the difference between RCS Tsat and which ONE of the following?

A. An average of the core exit thermocouples.

B. The maximum indicating core exit thermocouple.

✓C. The maximum quadrant average of core exit thermocouples.

D. The maximum indicating core exit thermocouple in the maximum averaged quadrant.

c

New Q 11/4/99

13521-1

LO-LP-05210-18-C

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM28	MEMORY	2/1	2/1	017	K4.01	3.4/3.7	N/A

Why the computer works

Why do we care

New Q

94". "Unit 1 is operating at 100% power when a large break LOCA occurs, followed immediately by a loss of offsite power. Which ONE of the following describes the response of the containment coolers to this event?

A. Four containment coolers start in fast speed approximately 30 seconds after the closure of diesel generator output breakers, followed by the start of four additional coolers in fast speed 20 seconds later.

B. Four containment coolers start in slow speed approximately 30 seconds after the closure of diesel generator output breakers, followed by the start of four additional coolers in slow speed 20 seconds later.

C. Four containment coolers start in fast speed approximately 30 seconds after the closure of diesel generator output breakers.

✓D. Four containment coolers start in slow speed approximately 30 seconds after the closure of diesel generator output breakers.

d

New Q 11/8/99

LO-LP-28201

LO-LP-29101

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM30	MEMORY	2/1	2/1	022	A3.03	4.1/4.3	N/A

95". "Unit 1 is stable at full power. Which ONE of the following would be the first indication of a failure of multiple nuclear service cooling water tubes in a containment cooler?

A. "CNMT HI MSTR" annunciator.

B. "CNMT HI TEMP" annunciator.

✓C. "CNMT CLR COND LEAK" annunciator. Press alert

D. "CNMT DRN SUMP SOUTH AREA HI-HI LVL" annunciator.

C

New Q 11/9/99

LO-LP-45101

17001-1

17061-1

17062-1

Not sure this is an analysis level question. It appears to RSB that it is a memory level question.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM31	ANALYSIS	2/1	2/1	022	K3.02	4.1/4.3	N/A

96". "Unit 1 is operating at 100% power with the 1A emergency diesel generator out-of-service for maintenance. A large break LOCA occurs with a concurrent loss of offsite power. The "B" train containment spray pump experiences a sheared ~~pump~~ shaft while starting.

Which ONE of the following correctly characterizes containment conditions for this event?

A. Containment temperature and pressure will remain within design values, as only one train of containment cooling is required for this event.

B. Containment temperature and pressure will remain within design values, as only one train of containment cooling is required for this event; however, post-accident containment atmosphere iodine levels will exceed analyzed values.

✓C. Containment temperature and pressure may exceed design values, as one train of containment cooling and one train of containment spray is required for this event.

D. Containment temperature and pressure may exceed design values, as one train of containment cooling and one train of containment spray is required for this event; however, post-accident containment atmosphere iodine levels will remain within analyzed values.

c

New Q 11/10/99

LO-LP-29120

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM32	ANALYSIS	2/2	2/1	026	K3.01	3.9/4.1	N/A

New Q on Gine Bas

97". "Unit 1 is at 15% power and escalating following an outage. Plant effluent vent monitor RE12442C is out of service for maintenance when plant effluent vent monitor RE12444C fails.

Which ONE of the following describes the impact of these plant conditions on containment conditions?

✓A. Containment pressure increases will have to be controlled through the use of containment cooling systems alone.

B. Containment pressure increases can be controlled through the use of containment cooling systems and the preaccess purge system.

C. Containment pressure increases can be controlled through the use of containment cooling systems and the containment mini-purge system.

D. Containment pressure increases cannot be controlled.

a
New Q 11/10/99
13125-1
VEGP ODCM, Table 3-1 (action 48)

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM33	ANALYSIS	2/2	2/2	029	K3.01	2.9/3.1	N/A

New Q

Look at 57

98". "A spent fuel pool low level alarm is received . Assuming no operator action and a continued loss of inventory, which ONE of the items below correctly represents the next major level-dependent event?

	Level above Spent fuel assemblies	Event
A.	22'	Loss of NPSH to SFP cooling pumps
B.	21'	Loss of adequate shielding over Spent fuel assemblies
✓C.	20'	Loss of suction to the SFP cooling pumps
D.	19'	Loss of adequate volume to remove 99% of the assumed 10% gap activity released from the rupture of an SFA

c
LO-LP-60322
13719-1
18030-C

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM34	MEMORY	2/2	2/2	033	A2.03	3.1/3.5	N/A

99". "A plant startup is in progress at 18% power. Turbine load is at about 125MW. A loss of power to 1NYS causes the "A" feed pump to coast down and feedwater discharge pressure falls below SG pressure. Which ONE of the following describes the REQUIRED operator actions?

LO LO

A. Trip the reactor and go to 19000-C, "Reactor Trip or Safety Injection."

✓B. Trip the reactor if SG level(s) are rapidly approaching the lo-lo level setpoint.

C. Restart the "A" feed pump using the manual potentiometer (GE pot).

D. Trip the reactor and go to 19000-C, "Reactor Trip or Safety Injection," while continuing in 18022-C, "Condensate and Feed Malfunction."

b

EB# LO-LP-60314-02-01 (#333)

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM35	COMP	2/1	2/1	059	K3.03	3.5/3.7	N/A

119". "A waste gas decay tank release is in progress. Which ONE of the following malfunctions occurring during the release could result in a release outside of permitted limits assuming no operator action?

A. RE-13, waste gas processing rad monitor, fails low.

B. FI-14, waste gas flow indicator, fails low.

✓C. RE-14, waste gas processing rad monitor, fails low.

D. Loss of power to RV-14, waste gas effluent isolation valve.

c

VG 95 SRO exam #94

LO-LP-46101-11-04

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM22	COMP	2/1	2/1	071	A2.02	3.3/3.6	VG95

120". "A fire team consisting of at least _______ members (including a team leader) shall be maintained on site at all times. The fire team leader is designated by _________, per procedure.

A. 4, the Shift Superintendent.

✓B. 5, the Shift Superintendent.

C. 4, the C & T Supervisor.

D. 5, the C & T Supervisor.

b
VG 95 SRO exam # 9
LO-LP-63503-05-08
10003-C, Pg 2
10000-C, Pg 1 & 2

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM23	MEMORY	2/2	2/2	086	G2.4.26	2.9/4.0	VG95

121". "In step 27 of EOP 19000-C, "Reactor Trip or Safety Injection," you check to see is ECCS flow should be reduced. The following conditions exist on Unit 2:

- SG #1 level = 5% NR
- SG #2 level = 7% NR
- SG #3 level = 12% NR
- SG #4 level = 9% NR
- RCS subcooling = 40 deg F
- RCS Pressure is stable
- PRZR level = 35%
- Total AFW flow = 500 gpm
- Containment pressure = 1.8 psig

The USS should:

✓A. Transition directly to 19011-C, "ES -1.1 SI Termination."

B. Transition to 19012-C, "ES-1.2 Post LOCA Cooldown and Depressurization."

C. Stay in 190~~10~~00-C until later transition.

D. Increase AFW flow to >570 gpm, then transition to 19011-C, "ES-1.1 SI Termination."

a

EB# LO-LP-37022-01-02 (#115)

Distractor C states stay in 190~~10~~00-C which is E-1 Loss of Reactor or Secondary Coolant. Is this correct since the stem of the question states you are in 19000-C? Need to review the bank question to see if this is a typo or not.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM38	COMP	1/2	1/1	000011	EA2.11	4.1*/4.2	N/A

122". "Given the following conditions:

- Leakage into #3 steam generator is determined to be .5 gpm.
- No leakage is detectable into the other steam generators.
- Other leakage which cannot be identified is determined to be .6 gpm.
- Leakage from known sources other than steam generator leakage is determined to be 4.0 gpm

Which ONE of the following identifies whether or not technical specification leakage limits are exceeded?

With these conditions in existence, Technical Specification leakage limits:

A. Are not exceeded.

B. Are exceeded due to the total leakage into the steam generator and unidentified leakage exceeding 1 gpm.

C. Are exceeded due to steam generator leakage exceeding limits for pressure boundary leakage.

✓D. Are exceeded due to excessive leakage into one steam generator.

d

95 SRO Exam #90
LO-LP-39208-02
EB# LO-LP-39208-02-01

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM43	COMP	1/2	1/2	000037	AA2.10	3.2/4.1	VG 95

124". "Given the following:

- Unit 1 tripped from 99.5% power due to a generator trip
- Both 13.8kV buses lose power when the generator trips and will not be restored for 4 days
- All plant parameters stabilize at no-load conditions without SI actuation

The crew responds to the trip without SI using EOP 19001, "ES-0.1 Reactor Trip Response."

Which ONE on the following describes how the crew should proceed?

A. Transition to UOP 12005, "Reactor Shutdown to Hot Standby (MODE 2 to MODE 3)," and maintain hot standby conditions.

✓B. Remain in 19001 until at least one RCP can be started.

C. Transition to 19002, "ES-0.2 Natural Circulation Cooldown," and establish natural circulation flow to maintain 557 deg F.

D. Transition to 19002-C to begin a cooldown to cold shutdown per LCO 3.4.5, "RCS Loops - MODE 3."

b

LO-LP-37011-04-06 (#65)

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM49	ANALYSIS	1/1	1/1	BW/E09	EA2.2	3.4/3.8	N/A

125". "Which ONE of the following would NOT be a reason to enter 19111-C, "ECA-1.1 Loss of Emergency Coolant Recirculation?"

A. loss of both RHR pumps.

✓B. failure of both RHR trains' loop suction valves to open.

C. inability to obtain emergency sump level.

D. train "A" RHR heat exchanger inoperable and a loss of BA03.

b

EB# LO-LP-37114-11-02 (#260)

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM53	ANALYSIS	1/2	1/2	W/E11	EA2.2	3.4/4.2	N/A

126". "Unit 1 is in MODE 3 with a reactor startup in progress (reactor trip breakers closed, rod withdrawal in progress) when source range nuclear channel "A" fails low. The crew suspends the startup in accordance with Technical Specification 3.3.1. T:TTLE

Which ONE of the following describes the basis for this action under technical specifications: T:TTLE

✓A. Two source range instrument channels are required to provide assurance that no random single failure will prevent a source range high flux trip in response to a continuous RCCA bank withdrawal event during startup.

B. Two source range instrument channels are required to provide assurance that no random single failure will prevent a source range high flux trip in response to reactivity anomalies associated with uncertainties in criticality calculations.

C. Two source range instrument channels are required to provide assurance that no random single failure will prevent a high flux at shutdown alarm in response to inadvertent dilution during startup.

D. Two source range instrument channels are required to provide assurance that no random single failure will prevent a high flux at shutdown alarm in response to inadvertent cooldown during startup.

a
New Q 11/17/99
T/S 3.3.1 bases
T/S 3.3.8 bases
LO-LP-60302

a. Correct answer per T/S bases

b. Correct on single failure, but uncertainties in criticality calcs not a part of bases

c. Correct on single failure, but T/S action for loss of HFAS alarm does not include suspension of addition of positive reactivity and alarm not req'd in MODE 2, so startup could proceed.

d. Correct on single failure, but T/S action for loss of HFAS alarm does not include suspension of addition of positive reactivity and alarm not based on cooldown (based on dilution).

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM54	COMP	1/2	1/2	000032	AK3.01	3.2/3.6	N/A

127". "Unit 1 is in MODE 3 with the following conditions:

- Temperature = 360 deg F
- Pressure = 2200 psig
- PRT pressure = 35 psig

Which ONE of the following tailpipe temperatures would be indicative of a substantial PORV seat leak?

✓A. 281 deg F

B. 320 deg F

C. 260 deg F

D. 435 deg F

a
New Q 11/17/99

a. Correct answer obtained by assuming isoenthalpic expansion with pressurizer steam enthalpy assumed to correspond to the enthalpy of saturated steam (100% quality) at 2014.7 psia, comparing value to enthalpy values at 50 psia (result is saturated conditions), and picking saturation temp for steam at 50 psia.

b. Incorrect answer obtained by entering saturated table at 360 psia and interpolating for constant entropy line.
c. Incorrect answer obtained by entering saturated tables at 35 psia and interpolating to obtain saturation temperature.

d. Incorrect answer obtained by entering saturated table at 360 on saturation line and constant temperature.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM55	ANALYSIS	1/2	1/2	000008	K1.01	3.2/3.7	N/A

128". "A Site Area Emergency was declared due to a LOCA on Unit 1. The emergency plan implementing procedures (EPIPs) are being implemented. The Plant manager has assumed the duties of Emergency Director. Which ONE of the following has approval authority for changes to the EPIPs?

A. any licensed SRO.

B. the Shift Supervisor.

✓C. the Emergency Director.

D. NRC.

C

New Q 11/99

LO-LP-63052-9, page 3

00052-C, "Temporary Changes to Procedures," page 2

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
ME21	MEMORY	3/2	3/2	GENERIC	2.2.6	2.3/3.3	N/A

129". "Which ONE of the following is a NON-DELEGATABLE duty of the Emergency Director?

A. Deploying radiological emergency teams.

B. Requesting OSC support for emergency maintenance.

✓C. Deciding to request assistance from federal support groups.

D. Coordinating VEGP emergency operations.

C

Q 16 from 95 SRO exam
LO-LP-40101-08-01

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM58	MEMORY	3/4	3/4	GENERIC	2.4.38	2.2/4.0	VG 95

130". "Immediately following a loss of all onsite and offsite AC power, the reactor trips and the SSS reports the following critical safety function status:

- ORANGE path on core cooling
- RED path on heat sink
- YELLOW path on inventory

Which ONE of the following describes the proper procedural usage in this condition?

✓A. Loss of all AC Power, 19100-C

B. Reactor Trip or Safety Injection, 19000-C

C. Response to Degraded Core Cooling, 19221-C

D. Response to Loss of Secondary Heat Sink, 19231-C

a
95 RO Q 73
LO-LP-37031-06-05

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM61	COMP	1/1	1/1	000055	2.1.20	4.3/4.2	VG 95

123". "Unit 2 was operating at 100% when it experienced a transient causing a 40% load reduction. Shortly thereafter, the gross failed fuel detector alarm was received and confirmed to be valid by chemistry. Subsequently, a SGTR in #3 S/G occurred. The unit was tripped and a manual SI was initiated. While performing the steps in 19030-C, "E-3 Steam Generator Tube Rupture," to isolate the ruptured S/G, a main steam safety valve (PSV-3022) failed fully open on loop 3 and could not be reseated. All safety systems functioned as expected.

The SS assumed the duties of Emergency Director and classified the event as a GENERAL EMERGENCY based on dose assessment results. While performing his required notifications to the state and local authorities, he also makes recommendations to protect th public from the anticipated release of radiation.

The Shift Superintendent/Emergency Director should:

A. Recommend all local residents take shelter until state and local authorities can respond to the emergency.

✓B. Recommend precautionary evacuation of all people within a 5-mile radius from the plant. Also evacuate people in the plume exposure pathway downwind up to 10 miles from the plant. Shelter the remainder of the plume EPZ.

C. Recommend precautionary evacuation of all people within a 2-mile radius from the plant and evacuation of people downwind that are expected to be located in the plume exposure pathway for a distance of 5 miles from the plant. Shelter the remainder of the EPZ.

D. Recommend that non-essential plant personnel be evacuated. With anticipated traffic problems associated with the departure of people from the plant, local residents should seek shelter from the plume.

b
P/91002-C, O/91204-C
EB# LO-LP-40 (#97)

Why does this this is good Question?

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
~~VGMM46~~	ANALYSIS	1/2	1/2	000038	2.4.44	2.1/4.0	N/A

Not from memory

Have JPM

109". "While performing the SI flow reduction sequence in 19012-C, "Post-LOCA Cooldown and Depressurization," SI flow can be reduced if RCS hot leg temperature is less than 350 deg F even if the subcooling criteria is not met.

Which ONE of the following is the basis for the temperature setpoint?

A. Ensures RHR can operate in the shutdown cooling mode to remove decay heat.

✓B. Ensures RHR can inject in the low head SI mode to maintain subcooling.

C. Ensures SI accumulators have injected their water.

D. Ensures SI accumulators will NOT inject nitrogen gas into the RCS.

b

EB# LO-LP-37112-01-02 (#241) Clay

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM48	COMP	1/2	1/2	BW/E08	EK2.2	3.7/4.0	N/A

[illegible]

?

80". "Unit 1 is operating at 100% power with bank "D" rods at 218 steps when an electrical failure deenergizes the "1CY1A" 120V AC vital instrument bus. You have noted that the rods cannot be withdrawn in auto or manual. Which ONE of the following is preventing rod motion?

A. C-1, IR over-power rod stop.

✓B. C-2, power range high flux rod stop.

C. C-3, over-temperature delta-T rod stop.

D. C-4, over-power delta-T rod stop.

b

EB# LO-LP-60324-01-02 (#457) p.18

P/18021-C, O/T/S 3.7.5

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM14	ANALYSIS	2/1	2/1	015	K2.01	3.3/3.7	N/A

write (WGDI)

61". "The # 1 Gas Decay Tank requires release. Which one of the following sequences is required to perform a gaseous release?

A. Chemistry obtains ~~and~~ analyzes a gas sample, Chemistry generates a gaseous effluent permit, Operations ~~verifies~~ reviews release information and commences release.

B. Chemistry obtains and analyzes a gas sample, Operations verifies the sample is within existing batch release permit, and commences release.

✓C. Chemistry obtains and analyzes a gas sample, Chemistry generates a gaseous effluent permit, Operations commences release when permit is received in the control room.

D. Chemistry obtains and analyzes a gas sample, Operations commences release when permit is received in the control room.

C. 13202-1 Gaseous Release. p. 2, 3 of 14

A. Chemistry does drawn the sample and develops the permit but procedure does not require the USS to approve the permit. Is this correct?

B. Batch release permits are used for liquid releases only, not for gas releases.

C. Answer

D. Needs to have a permit done by chemistry.

10CFR 43.4

This KA was used in stead of KA 2.3.8.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
RSB 16	2	RELEASES	G 2.3.6	2.1/3.1	NEW NA	MEMORY	SRO

Why log? Ops Review Release

49". "You have entered a Technical Specification LCO which prohibits core alterations. Which of the following activities would NOT be allowed to continue?

A. Movement of the core upper internals and the reactor vessel head in the storage location.

✓B. Movement of an RCCA within the reactor vessel.

C. Movement of a fuel assembly within the fuel storage area.

D. Movement of the SIGMA mast above the reactor vessel.

dont use this
done ~2 years
ago

B. LO-LP-39202-11-C
A. Prohibited if it is over the vessel.
B. Correct answer LO-LP-39202-11-C page 14
C. Prohibited if it is in the vessel.
D. Not prohibited per LO-LP-39202-11-C page 15

Why ?

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
LSM-019	1	COORDINATE	GEN 2.1.8	3.8/3.6	NEW	COGN	RO

47". "Unit 2 is at 100% power. Which one of the following actions is required if an RCS sample shows the chloride concentration is greater than its Transient Limit of 1.50 ppm?

A. Restore the chloride concentration to less than the Transient Limit within 24 hours.

B. Restore the chloride concentration to less than the Steady-State Limit within 24 hours.

✓C. Be in Mode 3 in six hours.

D. Immediately initiate action to reduce pressure to less than 500 psig.

REF: TR 13.4.1

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
ME19	3	CHEM	2.1.34	2.3/2.9	NEW	COMP	SRO

Review Chem
for TS Action

30". "What are the interlocks associated with the DRMS RE-0025?

✓A. Trips the steam boiler feed pump.

B. Turns the standby heater off.

C. Sends signal to hydraulic unit to close the sleeve.

D. Closes level control valve.

A: LO-LP-47110-17-C LO-9

A: Correct answer

B: System response to high pressure

C: Signal comes from standby heaters

D: Signal comes from high level in boiler

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
LSM-009	2	LIQ WASTE	068K5.04	3.2/3.5	NEW	MEMORY	SRO

?

[illegible]

Only in LP

15". "- Unit 2 is at 95% during a return to 100% power.
- At 1530 the QPTR alarm is received and it is determined that rod B-6 is misaligned from its bank by 24 steps.
- At 1540, Shut Down Margin is determined to be greater than the limits in the COLR.
- At 1545, the QPTR calculation is completed with the value determined to be 1.10.

Which one of the following describes the required operator actions?

A. Reactor power must be reduce to 88% by 1730.

✓B. Power must be reduce to 88% OR rod B-6 must be realigned to its bank by 1730.

C. Reactor power must be reduce to 88% by 1745.

D. Power must be reduce to 88% OR rod B-6 must be realigned to its bank by 1745.

LO-LP-39206-13-C, page 9

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
ME15	3	STUCK ROD	005 AK1.02	3.1/3.9	NEW	COMP	BOTH

?

New Q - Conflict with 17

14" "An spurious turbine runback occurred on Unit 1. The following plant conditions are observed:

- ROD BANK LO-LO LIMIT alarm is lit
- RCS Tavg = 561 degrees F
- RCS pressure = 2198 psig and slowly increasing
- PDP pump in service
- CCP "A" is OOS with suction and discharge valve tagged shut

Which one of the following describes the appropriate action for the RO to take?

A. Start CCP "B", open HV-112D and HV-112E, close HV-112B and HV-112C, verify at least 100 gpm charging flow through the normal charging flowpath.

B. Start CCP "B", start a BAT pump, open HV-8104, verify at least 30 gpm boric acid flow and 42 gpm charging flow.

C. Start a BAT pump, open HV-8104, verify at least 30 gpm boric acid flow and 42 gpm charging flow.

✓D. Start a BAT pump, open HV-110A and HV-110B, verify at least 30 gpm boric acid flow and 42 gpm charging flow.

EB# LO-LP-09401-04-10

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
ME14	3	EMERG BOR	024 AK3.02	4.2/4.4	BANK	COMP	BOTH

new Q to review STEM

Lo Lo Limit requires Emer Boration within 2 hr

DATE: what changed -

Follow up

13". "Which one of the following describes the operation of the Failed Fuel Detector?

✓A. Continally monitors delayed neutrons.

B. Continually monitors noble gas concentration.

C. Is placed in service with PASS and monitors delayed neutrons.

D. Is placed in service with PASS and monitors noble gas concentration.

REF: LO-LP-36105-11-C, page11

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
ME13	2	COOL ACT	076 AK2.01	2.6/3.0	NEW	MEMORY	BOTH

when mod Changed

DATE:- Follow up- why LP/Pass not Revised

100". "Which ONE of the following will NOT cause a recombiner shutdown?

A. HARC-1104 inlet H2 analyzer reading 9.5%.

B. OARC-1112 inlet O2 analyzer reading 4.0%.

C. OARC-1119 outlet O2 analyzer reading 90 ppm.

✓D. HAIC-1118 outlet H2 analyzer reading .35%.

d

EB# LO-LP-46101-08-04

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM36	MEMORY	2/1	2/1	071	A2.02	3.3/3.6	N/A

[illegible] not in Oper Training Program

101". "~~There are conditions which require the RO to shut down the reactor without prior approval. Of the situations listed below,~~ which ONE is NOT a time when the RO would shut down the reactor without prior approval?

A. Reactor power is 111%, no automatic trip.

B. Pressurizer level is decreasing rapidly for no apparent reason and cannot be restored using normal charging. Plant power is 100%.

✓C. A dropped rod causes hi negative flux rate on N-41, no automatic trip.

D. Turbine trip occurs at 100% power, no automatic trip.

C

EB# LO-LP-63300-03-01

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM37	MEMORY	1/2	1/2	000007	2.4.49	4.0/4.0	VG 95

102". "The crew is responding to a LOCA using 19012-C, "Post-LOCA Cooldown and Depressurization." SI has been reset. A loss of power then occurs on 1BA03 and the 1B EDG and sequencer responds properly. Which ONE of the following correctly applies to the conditions described?

A. SIP B and CCP B will both automatically start.

B. SIP B and CCP B should both be placed in pull-to-lock to prevent their starting automatically.

✓C. CCP B will start automatically, but SIP B must be started using the individual pump hand switch if it is needed.

D. SIP B and CCP should be started by initiating a manual SI.

C

EB# LO-LP-37022-07-02

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM39	COMP	1/2	1/1	000011	AE1.13	4.1*/4.2	N/A

103". "Given the following information:

- Unit 2 is in Mode 6
- RCS drained to 188.6 feet
- RCS temperature is 125 degrees F
- RCS pressure is approximately atmospheric
- Reactor has been shut down for 21 days
- Core reload is complete, replacing 1/3 of core with new fuel
- A total loss of RHR cooling has occurred

Which ONE of the following is correct concerning the amount of time it will take to reach saturated conditions in the RCS?

(Use the attached figures from AOP-18019-C, "Loss of RHR")

A. 27 minutes

✓B. 38 minutes

C. 50 minutes

D. 62 minutes

b

95 RO exam #88

LO-LP-60315-03-03

Need to supply figures

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM40	COMP	1/2	1/2	000025	K1.01	3.9/4.3	VG 95

104". "Given the following conditions:

- RCS pressure = 2335 psig
- RCS Tave = 588.3 deg F
- The reactor is not tripped
- The crew is currently in 19211-C, "FR-S.1, Response to Nuclear Power Generation/ATWT," step 5.

Which ONE of the following describes the reason why RCS pressure should be maintained less that 2335 psig?

A. Prevents the pressurizer relief tank from going solid (due to an open PORV or PRZR code safety valve) and blowing the rupture disc causing a LOCA inside containment.

B. To prevent the reactor from tripping on high RCS pressure.

✓C. To ensure a sufficient amount of boric acid is injected into the core to reduce reactor power.

D. To ensure pressurizer spray valves don't short cycle when the PORVs open to lower RCS pressure.

c

95 RO exam # 89

LO-LP-37041-050-02

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM41	MEMORY	1/2	1/1	000029	K3.12	4.4/4.7	VG 95

105". "Both units are in MODE 1 when high radiation alarms occur in the fuel handling building during the movement of irradiated fuel. The operator observes no bubbles from the pool and pool level is not lowering. Procedure 18006-C, "Fuel Handling Event," is entered.

Which ONE of the following is the correct action for the conditions stated?

✓A. Evacuate the fuel handling building.

B. Secure containment purge if in progress.

C. Enter 18030-C, "Loss of Spent Fuel Pool Cooling or Level," and 18004-C, "Reactor Coolant System Leakage."

D. Have HP determine the extent of damage to the fuel.

a

EB# LO-LP-60306-01-06 (#237)

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM42	MEMORY	1/3	1/3	000036	AK1.01	3.5/4.1	N/A

SECT H

106". "Unit 1 is in MODE 3. AOP 18009, "Steam Generator Tube Leakage," is being performed due to leakage in #3 SG. Per this AOP, which ONE of the following is the correct description of the actions (consider sequence also) required to reach MINIMUM break flow?

A. Cool down to 500 deg F, isolate #3 SG, depressurize the RCS to slightly below #3 SG pressure.

B. Isolate #3 SG, cool down to 500 deg F, depressurize the RCS to slightly below #3 SG pressure.

✓C. Isolate #3 SG, cool down to 500 deg F, depressurize the RCS to 25-30 psig greater than #3 SG pressure.

D. Cool down to 500 deg F, isolate #3 SG, depressurize the RCS to 25-50 psig greater than #3 SG pressure.

C

EB# LO-LP-60309-02-01 (#281)

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM44	MEMORY	1/2	1/2	000037	AA2.11	3.8/3.8*	N/A

107". "Emergency procedure 19030-C, "Steam Generator Tube Rupture," step 13 states, "Check Ruptured S/G Pressure - Greater than 290 psig." Subsequent steps direct the operator to dump steam from the intact S/Gs as rapidly as possible in order to establish adequate subcooling margin.

Which ONE of the following statements correctly describes the reason for checking ruptured S/G pressure greater than 290 psig?

✓A. To ensure that the ruptured S/G is not faulted and that a PTS condition will not be developed on the cooldown.

B. To ensure that RCS pressure will be less than the ruptured S/G pressure after the cooldown to stop primary to secondary leakage.

C. To ensure that the operator blocks the low steam line pressure SI signal, which would actuate below 290 psig.

D. To ensure an optimal RCS temperature is established which would preclude a return to criticality during the rapid RCS cooldown.

a

EB# LO-LP-37311-05-02 (#279)

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM45	MEMORY	1/2	1/2	000038	2.4.48	3.5/3.8	N/A

108". "A loss of 1AD1 occurs during a surveillance test on Train "A" diesel generator. The diesel generator has been paralleled to AA02 and is sharing the load with the "A" RAT.

The loss of 1AD1 will result in which ONE of the following:

A. diesel trip due to underfrequency.

B. loss of control to the diesel generator output breaker only.

✓C. loss of speed and voltage control along with the ability to shutdown the diesel from the control room.

D. no effect - 1AD1 power only affects the ability to start the diesel.

C

EB# LO-LP-60329-03-01 (#547)

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM47	ANALYSIS	1/2	1/2	000058	AK3.01	3.4*/3.7	N/A

110". "EOP 19100-C, "ECA-0.0 Loss of all AC Power," has been directly entered due to a loss of power on all AC emergency buses.

Which ONE of the following is true regarding transition out of 19100-C if no form of power has been restored to the AC emergency buses?

A. Functional restoration procedures (FRPs) should be implemented as any RED path is encountered.

B. FRPs should be implemented as time permits.

C. Only ATWT and loss of heat sink FRPs should be implemented.

✓D. Transition to FRPs is not permitted.

d

EB# LO-LP-37002-08-06

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM50	ANALYSIS	1/2	1/1	W/E01&E02	2.4.1	4.3/4.6	N/A

111". "The crew is responding to a primary LOCA outside containment. The reactor was tripped and SI was manually actuated. They have completed procedure 19112-C, "LOCA Outside Containment," and transitioned to 19111-C, "Loss of Emergency Coolant Recirculation," since they were unable to isolate the leak.

Which ONE of the following choices describes the correct actions to take in 19111-C under these conditions?

A. Initiate RCS cooldown, verify containment cooling units running in low speed, minimize the number of CS pumps running based on containment and RWST conditions.

B. Shift containment cooling units to fast speed, stop all containment spray pumps, and minimize ECCS flow to maintain at least 24 deg F subcooling.

C. Initiate RCS cooldown, establish one train of ECCS flow to maintain subcooling >74 deg F, and start makeup to the RWST.

✓D. Initiate RCS cooldown, minimize ECCS flow to keep RVLIS full range > 62% and start makeup to the RWST.

d

EB# LO-LP-37112-01-08 (#245)

Will this question provide information for another earlier question? Need to look at this.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM51	COMP	1/2	1/1	W/EO4	EK3.3	3.8/3.8	N/A

112". "Due to a problem on train "B" RHR, cold leg recirculation cannot be realigned to hot leg recirculation.

Which ONE of the following is the proper course of action?

A. maintain/realign both trains to cold leg recirculation.

✓B. place train "A" in hot leg recirculation and maintain/realign train "B" to cold leg recirculation.

C. place train "A" in hot leg recirculation and shut down train "B".

D. maintain/realign both trains for cold leg recirculation and begin a dilution within SDM constraints to minimize boron plating on the fuel assembly heat transfer surfaces.

b

EB# LO-LP-37114-10-03 (#259)

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM52	ANALYSIS	1/2	1/2	W/E11	EA2.1	3.4/4.2	N/A

113". "While at 100% power, a main feed water regulating valve fails open causing the affected SG level to exceed the hi-hi level setpoint. The reactor trips; however, no SG level drops below the lo-lo level setpoint. Assuming no operator action is taken, how many auxiliary feed water pumps will be running five (5) minutes after the trip?

A. none

B. one

C. two

✓D. three

d

113". "EB# LO-LP-20101-08-05

It is not obvious how 3 pumps wind up operating. The high level on one SG will result in a feedwater isolation and a trip of both MFPs. The trip of both MFPs will cause a start of the MDAFPs. The TDAFWP will only start on a lo-lo SG level in 2/4 SGs, a SBO, or an AMSAC signal. Lo-lo level may result in 5 minutes, due to cooldown or shrink. Need to run this on simulator or ask licensee why the TDAFWP starts. Note that LO-LP-28301 says:

"h. AMSAC actuation on Rx Trip

1) If you look at the actuation logic you will note that every Rx Trip from >40% Turbine Pwr will cause an AMSAC actuation
2) Within a few seconds after trip a FWIS is generated
3) This will cause all 4 loop feed flows to drop below the setpoint of 25%
4) The variable actuation timer will then start and will be set for 230 seconds (since the turbine trips before the FWIS the timer will be set for its maximum setting)
5) At the same time the turbine trip causes the C20 timer to start but since its setting is 260 seconds the actuation timer will always time out before the C20 timer can inhibit AMSAC

6) The AMSAC actuation is inconsequential on a normal trip.
   a) AFW already actuated, discharge valves have gone full open.
   b) If AFW discharge valves have been overridden by throttling after AFW actuation (white lights on) they will remain in that position if/when a subsequent AMSAC signal is received "

following a trip.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM56	ANALYSIS	1/2	1/2	000054	AA2.03	4.1/2.3	N/A

114". "Unit 2 is operating at 100% power. The RCP FRAME VIBRATION ALERT is received. Loop 3 RCP has a valid frame vibration ~~of 3.2 mils.~~

Which ONE of the following is procedurally required?

✓A. Monitor vibrations and shut down the pump using the appropriate SOP if it exceeds the indicated rate of vibration increase.

B. Reduce power and shut down the RCP in accordance with the appropriate SOP.

C. Trip the reactor and trip the RCP.

D. Consult Westinghouse for guidance.

a

RCP FRAME VIBRATION ALERT (window E03) ARP
LO-LP-16401-23
RCP FRAME VIBRATION ALERT (window E03) ARP
LO-LP-16401-23 conflicts with this implying that b is the correct answer. NEED facility resolution.

Justification:
b. This is true if vibes exceed 5 mils
d. This is true for Unit 2 pumps exceeding 20 mils shaft vibration

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
ME03	ANALYSIS	1/1	1/1	000015/17	AA1.23	3.1/3.2	N/A

Subsequent Actions

Change to Initial Actions

115". "Maintenance would like to remove the clearance on a breaker so they can cycle it in the TEST position.

Which ONE of the following correctly describes how this should be accomplished?

A. The hold tags must be temporarily removed and a hold tag must be placed on the racking device.

B. The hold tags must be remain on the breaker and a caution tag must be placed on the racking device.

✓C. The hold tags must be removed via a clearance release or functional release.

D. The hold tags can only be removed by closing out the clearance.

C

95 SRO Q 6

LO-LP-63304-11-03

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM59	MEMORY	3/2	3/2	GENERIC	2.2.13	3.6/3.8	VG 95

116". "Which ONE of the following statements defines a "radiation area?"

A. An area with 40% of the DAC limits in 10 CFR 20.

B. An area with 500 rad/hr dose rate.

✓C. An area with a dose rate equivalent of 5 mrem/hr, as measured at 30 cm from the radiation source.

D. An area with an absorbed dose rate of greater than 500 rad/hr at 30 cm from the source.

c
NEW Q 11/99
10 CFR 20

a. weak definition of airborne radioactivity area

b. partial definition of very high rad area

c. correct answer

d. full definition of very high rad area.

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM57	MEMORY	3/3	3/3	GENERIC	2.3.1	2.6/3.0	N/A

117". "Unit 2 is in a refueling outage. Train "A" ESFAS testing was started and then stopped to perform ILRT testing on critical path. The ILRT test took 27 hours to complete.

Which ONE of the following correctly states the required actions to be taken in order to restart the ESFAS test?

A. The section of the ESFAS test that was in progress must be performed over again.

✓B. The initial conditions must be reverified and then the procedure may be restarted at the section where suspended if desired.

C. Since the control room personnel agree that nothing has changed that affects the section of the train "A" ESFAS test being run, the test must be restarted at the same place where it was suspended.

D. Tests cannot be suspended. The ESFAS test must be started over from the beginning and run to completion.

b

95 SRO Exam Q #2

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM12	COMP	2/1	2/1	013	2.120	4.3/4.2	VG95

118". "Which ONE of the following is the preferred method of cooling the spent fuel pool on a loss of CCW to both trains of spent fuel pool cooling (SFPC)?

A. Feed and Bleed using Train "A" SFPC.

✓B. Feed and bleed using Train "B" SFPC.

C. Feed and Bleed using SFP purification pump.

D. Feed and bleed using the recycle evaporator feed pump.

b
EB# LO-LP-25102-15-01
LO-LP-25102
18030-C Pg 5

KEY WORDS:

Author/#	Cog Lvl	RO T/G	SRO T/G	Sys No.	KA	Importance	Last Used
VGMM18	MEMORY	2/2	2/2	033	A2.02	3.1/3.5	VG95

Facility: ____Vogtle__________________ Date of Examination: ____________
Exam Level (circle one): RO / SRO(I) / **SRO(U)** Operating Test No.: _______

B.1 Control Room Systems

	System / JPM Title	Type Code*	Safety Function
a.	**CRD/Dropped Rod Recovery. Use existing JPM RQ-JP-60303-002-01. At Step A15 of 18003-C, "Rod Control System Malfunction", when rod is approximately 20 steps off bottom, drop a rod in another bank.**	**Alternate Path New**	**I**
b.	LO-JP-29130-002-01 Reduce Containment Pressure Following CVI	Direct	V
c.	**RQ-JP-11205-002-01a Perform Monthly DG Surveillance Test (December) Diesel voltage fluctuates requiring output breaker trip.**	**Modified/ Alternate Path**	**VI**
d.	RCP/Start a Reactor Coolant Pump Seal leakoff parameters outside of acceptable region of 12001, Fig. 1. Candidate must correct conditions prior to start of RCP.	Modified/ Alternate Path	IV(P)
e.	NIS/Perform Power Range Calorimetric Channel Calibration	Direct	VIII
f.	RQ-JP-60317-001-01 NSCW/Respond to Loss of NSCW	Direct Control Room	VII
g.	**RQ-JP-37113-001-01a Transfer ECCS Pumps to Cold Leg Recirculation**	**Direct Control Room**	**II**

B.2 Facility Walk-Through

	Type Code*	Safety Function
a. PZR PC/Depressurize RCS Following SGTR (Steamline isolated and PORV sticks open)	**Alternate Path New**	III
b. RQ-JP-47411-001-01 Manually Isolate a Liquid Waste Release	Direct	IX
c. RQ-JP-20201-006-01 AFW/Reset Of The TDAFW Trip and Throttle Valve	**Direct**	IV(S)

* 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

DISTRIBUTION CODE
A070

Facility: VOGTLE		Date of Examination:
Examination Level (circle one): RO / **SRO**		Operating Test Number:

Administrative Topic/Subject Description		Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions
A.1	Conduct of Operations	Perform a Shutdown Margin Calculation in Mode 3
	Conduct of Operations	Evaluate Overtime Guidelines
A.2	Equipment Control	Clearance Review and Verification
A.3	Radiation Control	Calculate expected personnel exposure with and without use of a respirator for maintenance activity in high radiation airborne contamination area
A.4	Emergency Plan	PARS

Facility: VOGTLE Date of Examination: ______
Examination Level (circle one): RO /SRO Operating Test Number: ______

Administrative Topic/Subject Description		Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions
A.1	Conduct of Operations	Perform a Shutdown Margin Calculation in Mode 3
	Conduct of Operations	Evaluate Overtime Guidelines
A.2	Equipment Control	Clearance Review and Verification
A.3	Radiation Control	Calculate expected personnel exposure with and without use of a respirator for maintenance activity in high radiation airborne contamination area
A.4	Emergency Plan	Complete ENS Form within allowable Time (Site Area Emergency)

Facility:	Date of Exam:	Exam Level:												
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	4	5				4	5			4	24	24
	2	4	1	3				1	5			2	16	14
	3	1	1	0				1	0			0	3	3
	Tier Totals	7	6	8				6	10			6	43	
2. Plant Systems	1	2	1	3	2	3	0	2	1	2	0	3	19	18
	2	0	1	1	0	1	2	0	6	0	4	2	17	17
	3	0	0	1	1	0	1	0	1	0	0	0	4	4
	Tier Totals	2	2	5	3	4	3	2	8	2	4	5	40	
3. Generic Knowledge and Abilities		Cat 1	Cat 2	Cat 3	Cat 4								17	17
		3	5	4	5									

Note:
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.

GENERICS
□ CAT 1

□ CAT 2
2.2.13 SRO' 6 3.6/3.8

□ CAT 3
□ 2.3.1 RO' 7 2.6/3.0

□ CAT 4
□ 2.4.38 SRO 16 SRO ONLY 2.2/4.0

Done

	ES-401							PWR SRO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1	Form ES-401-3		
	E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points	
RFA01	000001 Continuous Rod Withdrawal / 1						X	2.1.33 ABILITY TO ID ENTRY INTO TS	3.4/4.0	1	?
RSB02	000003 Dropped Control Rod / 1		X					AK2.05 CONTROL ROD DRIVE POWER SUPPLIES & LOGIC CKTS	2.5/2.8	1	
ME15	000005 Inoperable/Stuck Control Rod / 1	X						AK1.02 FLUX TILT	3.1/3.9	1	
VGMM38	000011 Large Break LOCA / 3					X		EA2.11 ABILITY TO DET/INT CONDITIONS FOR THROTTLING HPI SRO ONLY	3.9/4.3	1	
VGMM51	W/E04 LOCA Outside Containment / 3			X				EK3.3 MANIPULATION OF CONTROLS TO OBTAIN DESIRED OUTCOME	3.8/3.8	1	
~~VGMM50~~	W/EO1 & E02 Rediagnosis & SI Termination / 3						X	2.4.1 KNOWLEDGE OF EOP ENTRY CONDITIONS	4.3/4.6	1	?
ME03	000015/17 RCP Malfunctions / 4				X			AA1.23 RCP VIBRATION	3.1/3.2	1	
VGMM49 ME06	BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4					X		EA2.2 ADHERANCE TO APP PROC - SRO ONLY	3.4/3.8	1	
ME14	000024 Emergency Boration / 1			X				AK3.02 ACTIONS CONT'D IN EOP	4.2/4.4	1	
ME10	000026 Loss of Component Cooling Water / 8			X				AK3.03 SRO' 79	4.0/4.2	1	
VGMM41	000029 Anticipated Transient w/o Scram / 1			X				000029 K3.12 RO 89	4.4/4.7	1	
ME02	000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4				X			AA1.18 CONTROL ROD POS INDICATORS	4.2/4.2	1	
VGMM61, ME05	CE/A11; W/E08 RCS Overcooling - PTS / 4	X	X					EK2.2 FAC. HEAT REMOVAL FUNCTIONS EK1.1 COMP, CAP, FUNC OF EMERG SYS	3.6/4.9 3.4/4.0	2	
ME11	000051 Loss of Condenser Vacuum / 4					X		000051 AA2.02 SRO 69	3.9/4.1	1	
vgmm61* ~~VGMM44~~ ME12	000055 Station Blackout / 6			x			X	2.1.20 RO 73 ~~SRO ONLY~~	4.3/4.2	1	
ME07	000057 Loss of Vital AC Elec. Inst. Bus / 6					X		AA2.18 IND, VLV, BKR, AMPR POSITION ON LOSS OF POWER	3.1/3.1	1	
~~RFA05~~	000059 Accidental Liquid RadWaste Rel. / 9				X			AA1.02 ARM SYSTEM	3.3/3.4	1	
ME01	000062 Loss of Nuclear Service Water / 4			X				AK3.02 AUTO ACTIONS ON ESFAS	3.6/3.9	1	
RSB03	000067 Plant Fire On-site / 9						X	2.4.27 KNOWLEDGE OF FIRE IN THE PLANT PROC SRO ONLY	3.0/3.5	1	
ME09	000068 (BW/A06) Control Room Evac. / 8		X					AK2.03 CONTROLLERS & POSITIONERS	2.9/3.1	1	
ME16	000069 (W/E14) Loss of CTMT Integrity / 5					X		AA2.01 LOSS OF CONT INTEG (ID, INTERP)	3.7/4.3	1	
~~ME04~~ RSB04	000074 (W/E06&E07) Inad. Core Cooling / 4				X			EA1.01 ABILITY TO OPERATE/MONITOR COMP, INCL I&C, SIGS, ETC	3.8/3.8	1	
	~~BW/E03 Inadequate Subcooling Margin / 4~~										
ME13	000076 High Reactor Coolant Activity / 9		X					AK2.01 PROCESS RAD MONITORS	2.6/3.0	1	
	~~BW/A02&A03 Loss of NNI-X/Y / 7~~										
	K/A Category Totals:	2	4	5	4	5	4	Group Point Total:		24	

Done

PWR SRO Examination Outline
Emergency and Abnormal Plant Evolutions - Tier 1/Group 2

Form ES-401-3

	E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
VGMM37	000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1						X	2.4.49 RO'3	4.0/4.0	1
	~~BW/A01 Plant Runback / 1~~									
	~~BW/A04 Turbine Trip / 4~~									
VGMM55	000008 Pressurizer Vapor Space Accident / 3	X						AK1.01 THERMO OF LEAKING VALVES	3.2/3.7	1
(ME04)	~~000009 Small Break LOCA / 3~~									
VGMM48	BW/E08; W/E03 LOCA Cooldown - Depress. / 4		X					EK2.2 HEAT REMOVAL SYSTEMS	3.7/4.0	1
VGMM53	W/E11 Loss of Emergency Coolant Recirc. / 4					X		EA2.2 ADHERANCE TO APP PROCEDURES & OPS WITHIN LIMITATIONS SRO ONLY	3.4/4.2	1
RFA02	000022 Loss of Reactor Coolant Makeup / 2				X			AA1.03 PZR LEVEL TREND	3.2/3.2	1
VGMM40	000025 Loss of RHR System / 4	X						000025 K1.01 RO88	3.9/4.3	1
ME08	000027 Pressurizer Pressure Control System Malfunction / 3			X				AK3.03 ACTIONS CONTAINED IN EOP FOR PCS MALFUNCTION	3.7/4.1	1
VGMM54	000032 Loss of Source Range NI / 7			X				AK3.01 REASON FOR STARTUP TERMINATION ON SR LOSS	3.2/3.6	1
RFA03	000033 Loss of Intermediate Range NI / 7	X						AK1.01 EFFECTS OF VOLTAGE CHANGE ON PERF	2.7/3.0	1
VGMM43	000037 Steam Generator Tube Leak / 3					X		037 AA2.10 SRO 90 SRO ONLY	3.2/4.1	1
~~VGMM46~~ VGMM44	000038 Steam Generator Tube Rupture / 3						X	2.4.44 KNOWLEDGE OF PARS SRO ONLY	2.1/4.0	1
VGMM56	000054 (CE/E06) Loss of Main Feedwater / 4					X		AA2.03 CONDITIONS/REASONS FOR AFW PUMP START	4.1/2.3	1
	~~BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4~~									
VGMM47	000058 Loss of DC Power / 6			X				AK3.01 USE OF DC POWER BY EDGS	3.4/3.7	1
	000060 Accidental Gaseous Radwaste Rel. / 9					X		AA2.03 STEPS NECESSARY TO ISOLATE LEAK w/ P&IDs	3.2/3.9	1
(MS04)	000061 ARM System Alarms / 7					X		AA2.05 NEED FOR AREA EVACUATION	3.5/4.2	1
RFA06	W/E16 High Containment Radiation / 9	X						EK1.3 ANNUNC & CONDITIONS AND SIGNALS / REMEDIAL ACT	3.0/3.3	1
	~~000065 Loss of Instrument Air / 8~~									
	~~CE/E09 Functional Recovery~~									
	K/A Category Point Totals:	4	1	3	1	5	2	Group Point Total:		16

EB# LO-LP-16303-03-19 #253

Done

Emergency and Abnormal Plant Evolutions - Tier 1/Group 3

	E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points	
	~~000028 Pressurizer Level Malfunction / 2~~										
YGMM42	000036 (BW/A08) Fuel Handling Accident / 8	X						AK1.01 RAD EXPOSURE HAZZARDS		1	
RSB01	000056 Loss of Off-site Power / 6				X			AA1.10 MDAFWP	4.3/4.3	1	WQ
	~~BW/E13&E14 EOP Rules and Enclosures~~										
	~~BW/A05 Emergency Diesel Actuation / 6~~										
	~~BW/A07 Flooding / 8~~										
	~~CE/A16 Excess RCS Leakage / 2~~										
RSB02	W/E13 Steam Generator Over-pressure / 4		X					EK2.1 COMP & FUNCTIONS OF CONTROL & SAFETY SYS INC I&C	3.0/3.1	1	WQ
	~~W/E15 Containment Flooding / 5~~										
	K/A Category Point Totals:	1	1	0	1	0	0	Group Point Total:		3	

Done

PWR SRO Examination Outline
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
- VGMM01	001 Control Rod Drive									X			001 A3.04 RO 36	3.5/3.8	1
VGMM02 VGMM03	003 Reactor Coolant Pump		X					X					003 A1.09 RO37 003 K2.01 POWER SUPPLY TO RCPS	2.8/2.8 3.1/3.1	2
VGMM05 ~~VGMM 04~~ NEW 01	004 Chemical and Volume Control					X		X					004 K5.19 CONCEPT OF SDM	3.5/3.9	1
VGMM27 & 12	013 Engineered Safety Features Actuation			X								X	2.1.20 SRO 2 SRO ONLY 013 K3.01 FUEL	4.3/4.2 4.4/4.7	2
VGMM13	014 Rod Position Indication					X							014 K5.01 RO 42	2.7/3.0	1
VGMM15	015 Nuclear Instrumentation											X	2.1.11 KNOWLEDGE OF <1 HR T/S A/S	3.0/3.8	1
VGMM28	017 In-core Temperature Monitor				X								K4.01 INPUT TO SUBCOOLING MONITORS	3.4/3.7	1
VGMM30	022 Containment Cooling									X			A3.01 INITIATION OF SAFEGUARDS MODE	4.1/4.3	1
	~~025 Ice Condenser~~														
VGMM32	026 Containment Spray			X									026 K3.01 CONT COOLING SYS	3.9/4.1	1
- LSM-002	056 Condensate	X											K1.03 MFW	2.6*/2.6	1
VGMM35	059 Main Feedwater			X									K3.03 SGs	3.5/3.7	1
LSM 003, VGMM 21	061 Auxiliary/Emergency Feedwater	X						X					061 K1.02 SRO'29 A1.04 AFW SOURCE TANK LEVEL	3.4/3.7 3.9/3.9	2
LSM 005	063 DC Electrical Distribution											X	2.1.24 ABILITY TO OBTAIN & INTERP DWGS	2.8/3.1	1
~~LSM 009~~	068 Liquid Radwaste					X							SRO ONLY K5.04 BIOHAZARDS OF RADS / ALARA	3.2/3.5	1
VGMM22	071 Waste Gas Disposal								X				071 A2.02 SRO 93 SRO ONLY	3.3/3.6	1
, LSM011	072 Area Radiation Monitoring				X								K4.01 CONT VENT 150	3.3/3.6	1
	K/A Category Point Totals:	2	1	3	2	3	0	2	1	2	0	3	Group Point Total:		19

Done

	ES-401	PWR SRO Examination Outline Plant Systems - Tier 2/Group 2											Form ES-401-3		
	System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points
	~~002 Reactor Coolant~~														
VGMM07	006 Emergency Core Cooling										X		006 A4.07 RO 44	4.4/4.4	1
VGMM08	010 Pressurizer Pressure Control										X		010 A4.01 PZR SPRAY VLV	3.7/3.5	1
VGMM10	011 Pressurizer Level Control										X		011 A4.05 LETDOWN FLOW CONTROLLER	3.2/2.9	1
VGMM26	012 Reactor Protection								X				012 A2.01 FAULTY BISTABLE OPERATION	3.1/3.6	1
VGMM16	016 Non-nuclear Instrumentation								X				016 A2.03 INTERRUPTION OF XMTD SIG	3.0/3.3*	1
	~~027 Containment Iodine Removal~~														
	~~028 Hydrogen Recombiner and Purge Control~~														
~~VGMM33~~	029 Containment Purge			X									029 K3.01 CONT PARAMETERS	2.9/3.1	1
VGMM18	033 Spent Fuel Pool Cooling								X				033 A2.02 SRO 45 SRO ONLY	2.7/3.0	1
RSB08N	034 Fuel Handling Equipment							X					034 A1.02 ~~A2.02 DROPPED CASK~~	3.4/3.9	1
VGMM19	035 Steam Generator						X						035 K6.03 S/G LEVEL DET	2.6/3.0	1
VGMM20	039 Main and Reheat Steam								X				039 A2.04 MALFUNCTIONING STM DMP	3.4/3.7	1
	~~055 Condenser Air Removal~~														
NEW06 ~~LSM004~~	062 AC Electrical Distribution		X										062 K2.01 MAJOR SYSTEM LOADS	3.3/3.4	1
LSM006	064 Emergency Diesel Generator						X						064 K6.08 FUEL OIL STORAGE TANKS	3.2/3.3	1
LSM13N	073 Process Radiation Monitoring 41 28					X			X				073 A2.02 ~~K5.02 RAD INTENSITY w/ DISTANCE~~	2.5/3.1	1
LSM14 MS01	075 Circulating Water								X			X	075 A2.02 LOSS OF CIRC WATER PUMPS	2.5/2.7	1
MS02	079 Station Air										X		079 A4.01 X-TIE w/ IAS	2.7/2.7	1
VGMM23	086 Fire Protection											X	2.4.26 SRO 9 SRO ONLY	2.9/3.3	1
VGMM04	103 Containment											X	2.1.12 SRO 75	2.9/4.0	1
	K/A Category Point Totals:	0	1	1	0	1	2	0	6	8	4	2	Group Point Total:		17

PWR SRO Examination Outline
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
VGMM60	005 Residual Heat Removal						X						005 K6.03 RHR Hx	2.5/2.6	1
VGMM25	007 Pressurizer Relief/Quench Tank			X									007 K3.01 EFFECTS ON CONT	3.3/3.6	1
VGMM09	008 Component Cooling Water								X				008 A2.02 SRO 66	3.2/3.5	1
	~~041 Steam Dump/Turbine Bypass Control~~														
ESB05	045 Main Turbine Generator				X								K4.11 T/G Rx TRIP	3.6/3.9	1
	~~076 Service Water~~														
	~~078 Instrument Air~~				X										
	K/A Category Point Totals:	0	0	1	1	0	1	0	1	0	0	0	Group Point Total:		4

Plant-Specific Priorities

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

GENERIC SRO (17)

SRO ONLY FROM TIERS 1 & 2

CAT 1

- 2.1.6 1 SRO ONLY 2.1/4.3 ME 18
B ~~2.1.10 SRO ONLY 2.7/3.9~~ 2.1.20 4.3/4.2 ME 17
- 2.1.34 SRO ONLY 2.3/2.9 ME 19

CAT 2

B 2.2.13 SRO 6 3.6/3.8 VGMM 59
~~2.2.3 SRO ONLY 3.1/3.3~~
2.2.6 SRO ONLY 2.3/3.3 ME 21
- 2.2.26 SRO ONLY 2.5/3.7 RSB 10
- 2.2.28 SRO ONLY 1.6/3.8 RSB 14
B 2.2.1 LSM-021

CAT 3

B 2.3.1 ~~RO 7~~ NEW Q VGMM57 2.6/3.0
- 2.3.2 SRO ONLY 2.5/2.9 RSB 11
~~2.3.8 SRO ONLY 2.3/3.2 RSB 13 #59~~
- 2.3.9 SRO ONLY 2.5/3.4 RSB 08
S 2.3.6 RSB 16

CAT 4

2.4.38 SRO 16 SRO ONLY 2.2/4.0 VGMM 58
~~2.4.1 SRO ONLY 4.3/4.6 RSB 15~~
2.4.9 SRO ONLY 3.3/3.9 RSB 12
B 2.4.21 3.7/4.3 RSB 09
~~2.4.32 3.3/3.5~~ NOT FOUND
B 2.4.10 LSM 023
S 2.4.44 VGMM 46

Facility: Date of Exam: Exam Level:

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	4				3	4			1	16	
	2	3	3	2				3	2			4	17	18
	3	1	1	0				1	0			0	3	
	Tier Totals	6	6	6				7	6			5	36	
2. Plant Systems	1	3	2	3	2	3	0	2	3	2	2	1	23	22
	2	0	1	4	0	3	2	0	5	0	4	1	20	
	3	1	0	1	1	0	1	0	3	0	0	1	8	
	Tier Totals	4	3	8	3	6	3	2	11	2	6	3	51	

3. Generic Knowledge and Abilities	Cat 1	Cat 2	Cat 3	Cat 4		
	3	3	3	4	13	13

Note:
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.

GENERIC

□ CAT 1

□ CAT 4

□ CAT 2
2.2.13 SRO'6 3.6/3.8

□ CAT 3
2.3.1 RO'7 2.6/3.0

Done

	ES-401							PWR RO Examination Outline Emergency and Abnormal Plant Evolutions - Tier 1/Group 1		Form ES-401-4
	E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
ME15	000005 Inoperable/Stuck Control Rod / 1	X						AK1.02 FLUX TILT	3.1/3.9	1
ME03	000015/17 RCP Malfunctions / 4				X			AA1.23 RCP VIBRATION	3.1/3.2	1
ME06	BW/E09; CE/A13; W/E09&E10 Natural Circ. / 4					X		EA2.1 FAC CONDITIONS & SELECT APP PROCEDURES	3.1/3.8	1
ME14	000024 Emergency Boration / 1			X				AK3.02 ACTIONS CONT IN EOP	4.2/4.4	1
ME10	000026 Loss of Component Cooling Water / 8			X				AK3.03 SRO'79	4.0/4.2	1
ME08	000027 Pressurizer Pressure Control System Malfunction / 3						X	2.1.7 ABILITY TO EVALUATE PLANT PERFORMANCE & MAKE JUDGEMTS	3.7/4.4	1
ME02	000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / 4				X			AA1.18 Control Rod Position Indicators	4.2/4.2	1
ME05	CE/A11; W/E08 RCS Overcooling - PTS / 4	X						EK1.1 COMPONENTS, CAPACITY & FUNCTION OF EMERG SYSTEMS	3.5/3.8	1
ME11	000051 Loss of Condenser Vacuum / 4					X		000051 AA2.02 SRO 69	3.9/4.1	1
ME12	000055 Station Blackout / 6			X				000055 EK3.02 SRO 70	4.3/4.6	1
ME07	000057 Loss of Vital AC Elec. Inst. Bus / 6					X		AA2.18 IND, VLV, BKR, DMPR POS which will occur on loss of power	3.1/3.1	1
ME01	000062 Loss of Nuclear Service Water / 4			X				AK3.02 AUTO ACTIONS ON ESFAS	3.6/3.9	1
	~~000067 Plant Fire On-site / 9~~						X			
ME09	000068 (BW/A06) Control Room Evac. / 8		X					AK2.03 CONTROLLERS & POSITIONERS	2.9/3.1	1
ME16	000069 (W/E14) Loss of CTMT Integrity / 5					X		AA2.01 LOSS OF CONTAINMENT INTEG (ID, INTERP)	3.7/4.3	1
~~ME04~~ RSR04	000074 (W/E06&E07) Inad. Core Cooling / 4				X			EA1.01 ABILITY TO OPERATE/MONITOR COMPONENTS INCL I&C, SIGS, ETC	3.8/3.8	1
	~~BW/E03 Inadequate Subcooling Margin / 4~~									
ME13	000076 High Reactor Coolant Activity / 9		X					AK2.01 PROCESS RAD MONITORS	2.6/3.0	1
	~~BW/A02&A03 Loss of NNI-X/Y / 7~~									
	K/A Category Totals:	2	2	4	3	4	1	Group Point Total:		16

Done

ES-401

PWR RO Examination Outline
Emergency and Abnormal Plant Evolutions - Tier 1/Group 2

Form ES-401-4

	E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points
-RFA01	000001 Continuous Rod Withdrawal / 1						X	2.1.33 ABILITY TO ID ENTRY INTO TS	3.4/4.0	1
-RSB02	000003 Dropped Control Rod / 1		X					AK2.05 CONTROL ROD DRIVE POWER SUPPLIES & LOGIC CKTS	2.5/2.8	1
-VGMM37	000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / 1						X	2.4.49 RO' 3	4.0/4.0	1
	~~BW/A01 Plant Runback / 1~~									
	~~BW/A04 Turbine Trip / 4~~									
VGMM29*	~~000008 Pressurizer Vapor Space Accident / 3~~									
ME04	~~000009 Small Break LOCA / 3~~									
-VGMM39	000011 Large Break LOCA / 3				X			EA1.13 ABILITY TO OPERATE/MONITOR SI COMP	4.1*/4.2	1
VGMM51	W/E04 LOCA Outside Containment / 3			X				EK3.3 MANIPULATION OF CONTROLS REQ'D TO OBTAIN DESIRED RESULT	3.8/3.8	1
VGMM48	BW/E08; W/E03 LOCA Cooldown/Depress. / 4		X					EK2.2 FAC'S HEAT REMOVAL SYSTEMS	3.7/4.0	1
VGMM52	W/E11 Loss of Emergency Coolant Recirc. / 4					X		EA2.1 FAC COND & SELECT OF APP PROC	3.4/4.2	1
~~VGMM50~~	W/EO1 & E02 Rediagnosis & SI Termination / 3						X	2.4.11 KNOWLEDGE OF EOP ENTRY CONDITIONS	4.3/4.6	1
-RFA02	000022 Loss of Reactor Coolant Makeup / 2				X			AA1.03 PZR LEVEL TREND	3.2/3.2	1
-VGMM40	000025 Loss of RHR System / 4	X						000025 K1.01 RO 88	3.9/4.3	1
-VGMM41	000029 Anticipated Transient w/o Scram / 1			X				000029 K3.12 RO 89	4.4/4.7	1
	~~000032 Loss of Source Range NI / 7~~									
-RFA03	000033 Loss of Intermediate Range NI / 7	X						AK1.01 EFFECTS OF VOLTAGE CHANGE ON PERF	2.7/3.0	1
VGMM44	000037 Steam Generator Tube Leak / 3		X					AA2.11 WHEN TO ISOLATE 1 OR MORE SG	3.8/3.8*	1
VGMM45	000038 Steam Generator Tube Rupture / 3						X	2.4.48 ABILITY TO VERIF CR IND/UNDERSTAND HOW OP'R INTERACTIONS..	3.5/3.8	1
	~~000054 (CE/E06) Loss of Main Feedwater / 4~~									
	~~BW/E04; W/E05 Inadequate Heat Transfer - Loss of Secondary Heat Sink / 4~~									
	~~000058 Loss of DC Power / 6~~									
~~RFA05~~	000059 Accidental Liquid RadWaste Rel. / 9				X			AA1.2 ARM SYSTEM	3.3/3.4	1
	~~000060 Accidental Gaseous Radwaste Rel. / 9~~									
(MJ04)	000061 ARM System Alarms / 7					X		AA2.05 NEED FOR AREA EVACUATION	3.5/4.2	1
-(RFA06	W/E16 High Containment Radiation / 9	X						EK1.3 ANNUNC & CONDITIONS IND SIGNALS/REMEDIAL ACTION	3.0/3.3	1
	~~CE/E09 Functional Recovery~~									
	K/A Category Point Totals:	3	3	2	3	2	4	Group Point Total:		17

Done

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

	E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Points	
	~~000028 Pressurizer Level Malfunction / 2~~										
VGMM42	000036 (BW/A08) Fuel Handling Accident / 8	X						AK1.01 RAD EXPOSURE HAZZARDS	3.5/4.1	1	✓
RSB01	000056 Loss of Off-site Power / 6				X			AA1.10 MDAFWP	4.3/4.3	1	WQ
	~~000065 Loss of Instrument Air / 8~~										
	~~BW/E13&E14 EOP Rules and Enclosures~~										
	~~BW/A05 Emergency Diesel Actuation / 6~~										
	~~BW/A07 Flooding / 8~~										
	~~CE/A16 Excess RCS Leakage / 2~~										
RSB02	W/E13 Steam Generator Over-pressure / 4		X					EK2.1 COMP & FUNCTIONS OF CONTROL & SAFETY SYS INC I&C	3.0/3.1	1	WQ
	~~W/E15 Containment Flooding / 5~~										
	K/A Category Point Totals:	1	1	0	1	0	0	Group Point Total:		3	

Done

ES-401

PWR RO Examination Outline
Plant Systems - Tier 2/Group 1

Form ES-401-4

	System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Points	
VGMM01	001 Control Rod Drive									X			001 A3.04 RO 36	3.5/3.8	1	✓
VGMM02 VGMM03	003 Reactor Coolant Pump		X					X					003 A1.09 RO 37 003 K2.01 POWER SUPPLY TO RCPs	2.8/2.8 3.1/3.1	2	✓ ✓
~~VGMM04~~, VGMM05 NEW 01 NEW 02	004 Chemical and Volume Control					X			X				004 K5.19 CONCEPT OF SDM 004 A2.12 SIAS	3.5/3.9 4.1/4.3	2	✓ ✓
VGMM11, VGMM27	013 Engineered Safety Features Actuation			X		X							013 K3.01 FUEL 013 K5.02 SAFETY SYSTEM LOGIC & RELIABILITY	4.4/4.7 2.9/3.3	2	WQ ✓
VGMM15 VGMM14	015 Nuclear Instrumentation		X									X	015 K2.01 BUS POWER SUPPLY TO NI CHANNELS ... 2.1.11 KNOWLEDGE OF <1 HR TS A/S	3.3/3.7 3.0/3.8	2	✓ WQ
VGMM 28 & 39	017 In-core Temperature Monitor	X			X								K1.01 PLANT COMPUTER K4.01 INPUT TO SUBCOOLING MONITORS	3.2*/3.2* 3.4/3.7	2	WQ WQ
VGMM30, 31	022 Containment Cooling			X						X			K3.02 CONTAINMENT INST READINGS A3.01 INITIATION OF SAFEGUARDS MODE	3.0/3.3 4.1/4.3	2	WQ WQ
	~~025 Ice Condenser~~															
LSM-002	056 Condensate	X											K1.03 MFW	2.6*/2.6	1	WQ
NEW 04 VGMM35	059 Main Feedwater			X									K3.03 SGS	3.5/3.7	1	✓
LSM003 VGMM 21	061 Auxiliary/Emergency Feedwater	X						X					061 K1.02 SRO' 29 A1.04 AFW SOURCE TANK LEVEL	3.4/3.7 3.9/3.9	2	✓ WQ
LSM007 ~~LSM008~~	068 Liquid Radwaste					X					X		K5.03 UNITS OF RADS A4.03 STOPPAGE OF RELEASE IF LIMITS EX.	2.6/2.6 3.9/3.8	2	WQ WQ
LSM010 VGMM36	071 Waste Gas Disposal								X		X		A2.02 USE OF MONITORS/INSTS A4.13 RECOVERY FROM TERMINATION DUE TO RADS	3.3/3.6 3.0/3.1	2	WQ ✓
LSM011 LSM012	072 Area Radiation Monitoring				X				X				K4.01 CONTAINMENT VENT ISOLATION A2.01 ERRATIC/FAILED POWER SUPPLY	3.3/3.6 2.7/2.9	2	WQ WQ
	K/A Category Point Totals:	3	2	3	2	3	0	2	3	2	2	1	Group Point Total:		23	

Dave

PWR RO Examination Outline
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	
VGMM06	002 Reactor Coolant					X							002 K5.12 RO 43	3.7/3.9	1	✓
VGMM07	006 Emergency Core Cooling										X		006 A4.07 RO 44	4.4/4.4	1	✓
VGMM08	010 Pressurizer Pressure Control										X		010 A4.01 PZR SPRAY VALVE	3.7/3.5	1	✓
VGMM10	011 Pressurizer Level Control										X		011 A4.05 LETDOWN FLOW CONTROLLER	3.2/2.9	1	✓
VGMM26	012 Reactor Protection								X				012 A2.01 FAULTY BISTABLE OPERATION	3.1/3.6	1	WQ
VGMM13	014 Rod Position Indication					X							014 K5.01 RO 42	2.7/3.0	1	✓
VGMM16	016 Non-nuclear Instrumentation								X				016 A2.03 INTERRUPTION OF TRANSMITTED SIG	3.0/3.3*	1	✓
VGMM32	026 Containment Spray			X									026 K3.01 CONT COOLING SYSTEM	3.9/4.1	1	WQ
~~VGMM33~~	029 Containment Purge			X									029 K3.1 CONT PARAMETERS	2.9/3.1	1	WQ
VGMM34	033 Spent Fuel Pool Cooling								X				033 A2.03 ABNORMAL SFP W/L	3.1/3.5	1	WQ
VGMM19	035 Steam Generator						X						035 K6.03 S/G LEVEL DETECTOR	2.6/3.0	1	✓
VGMM20	039 Main and Reheat Steam								X				039 A2.04 MALFUNCTIONING STEAM DUMP	3.4/3.7	1	✓
LSM-001	055 Condenser Air Removal			X									055 K3.01 MAIN CONDENSER	2.5/2.7	1	WQ
NEW 06 ~~LSM004~~	062 AC Electrical Distribution		X										062 K2.01 MAJOR SYSTEM LOADS	3.3/3.4	1	WQ
LSM005	063 DC Electrical Distribution											X	2.1.24 ABILITY TO OBTAIN & INTERP DWGS	2.8/3.1	1	WQ
LSM006	064 Emergency Diesel Generator						X						064 K6.08 FUEL OIL STORAGE TANKS	3.2/3.3	1	WQ
LSM13N	073 Process Radiation Monitoring					X			X				073 A2.02 ~~K5.02 RAD INTENSITY W/ DISTANCE~~	2.5/3.1	1	WQ
LSM14 MS01	075 Circulating Water								X			X	075 A2.02 LOSS OF CIRC PUMPS	2.5/2.7	1	WQ
MS0.2	079 Station Air										X		079 A4.01 X-TIE W/ IAS	2.7/2.7	1	WQ
LSM017	086 Fire Protection											X	086 G 2.4.7 ~~K3.01 S/D W/ REDUNDANT EQUIP~~	2.7/3.2	1	WQ
	K/A Category Point Totals:	0	1	4	0	3	2	0	5	0	4	1	Group Point Total:		20	

PWR RO Examination Outline
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	
VGMM60	005 Residual Heat Removal						X						005 K6.03 RHR HX	2.5/2.6	1	WQ
VGMM205	007 Pressurizer Relief/Quench Tank			X									007 K3.01 EFFECTS ON CONT	3.3/3.6	1	WQ
VGMM09	008 Component Cooling Water								X				008 A2.02 SRO 66	3.2/3.5	1	✓
	~~027 Containment Iodine Removal~~															
VGMM17	028 Hydrogen Recombiner and Purge Control								X				028 A2.02 RO 60	3.5/3.9	1	✓
RSB08N	034 Fuel Handling Equipment							X					~~A2.02~~ A1.02 ~~DROPPED CASK~~	3.4/3.9	1	WQ
	~~041 Steam Dump/Turbine Bypass Control~~															
RSB05	045 Main Turbine Generator				X								K4.11 T/G Rx TRIP	3.6/3.9	1	WQ
~~MS03~~	076 Service Water	X											K1.01 RELATIONSHIP TO CCW	3.4/3.3	1	
NEW03	~~078 Instrument Air~~				X											
~~VGMM24~~	103 Containment											X	2.1.12 SRO 75	3.4/4.1	1	✓
	K/A Category Point Totals:	1	0	1	1	0	1	0	3	0	0	1	Group Point Total:		8	

Plant-Specific Priorities

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

GENERIC RO (13)

CAT 1

	2.1.3.	3.0/3.4	LSM-18
	2.1.8	3.8/3.6	LSM-19
	2.1.33	3.4/4.0	LSM-20
B	2.1.20		ME 17

CAT 2

B	2.2.13	SRO'6	3.6/3.8	VGMM59
	2.2.1	3.7/3.6	LSM-21	
	2.2.30	3.5/3.3	LSM-22	

RSB 16 2.3.6

CAT 3

B	2.3.1	~~RO' 7~~ NEW Q VGMM57	2.6/3.0
	2.3.10	2.9/3.3	RSB 07
	2.3.14	2.7/3.2	RSB 17

CAT 4

B	2.4.21	3.7/4.3	RSB 09
	~~2.4.32~~	~~3.3/3.5~~	NOT FOUND
	~~2.4.3~~	~~3.5/3.8~~	~~LSM 024 #67~~
B	2.4.10	3.0/3.1	LSM 023
	2.4.1		RSB 15