Facility: ANO-1	Date of Examination: **8/22/2016**
Examination Level: RO ☒ SRO ☐	Operating Test Number: **2016-1**

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
A1 Conduct of Operations KA – 2.1.5, Importance rating 2.9 (RO/SRO)	R, N	Given their work history, select the eligible operators to fill vacancy due to illness of the on watch ATC.
A2 Conduct of Operations KA- 2.1.20, Importance 4.6 RO/SRO	R, D,P	Perform calculation for makeup to the Spent Fuel Pool
A3 Equipment Control KA – 2.2.13, Importance 4.1 RO	R, N	Determine the mechanical and electrical boundary isolations for P-36B Makeup Pump seal leak. (Do not need to drain the pump)
A4 Radiation Control KA – 2.3.7, Importance 3.5 RO	R, N	Given a survey map and associated RWP, determine the entry requirements to perform a task in the P-34A Decay Heat Removal Pump Room.
Emergency Plan		Not used

NOTE: All items (five total) are required for SROs. RO applicants require only four items unless they are retaking only the administrative topics (which would require all five items).

* Type Codes & Criteria:
(C)ontrol room, (S)imulator, or Class(R)oom
(D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes)
(N)ew or (M)odified from bank (≥ 1)
(P)revious 2 exams (≤ 1; randomly selected)

Facility: ANO-1	Date of Examination: 8/22/2016
Examination Level: RO ☐ SRO ☒	Operating Test Number: 2016-1

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
A5 Conduct of Operations KA – 2.1.5, Importance rating 3.9 (RO/SRO)	R, N	Given their work history, select the eligible operators to fill vacancy due to illness of the on watch ATC.
A6 Conduct of Operations KA- 2.1.20, Importance 4.6 RO/SRO	R, D,P	Perform calculation for makeup to the Spent Fuel Pool
A7 Equipment Control KA – 2.2.13, Importance 4.3 SRO	R, N	Review and approve the tagout provided for P-36B Makeup Pump seal leak. If not approved, provide the reasons why.
A8 Radiation Control KA – 2.3.4, Importance 3.7 SRO	R, N	Provided with the dose history for each individual. Determine which of the 5 are eligible for performing the task during an emergency situation.
A9 Emergency Plan KA – 2.4.44, Importance 4.4 SRO	R, D	Determine the correct PAR and evacuation/sheltering required for a given GE.

NOTE: All items (five total) are required for SROs. RO applicants require only four items unless they are retaking only the administrative topics (which would require all five items).

* Type Codes & Criteria:
(C)ontrol room, (S)imulator, or Class(R)oom
(D)irect from bank (≤ 3 for ROs; ≤ 4 for SROs & RO retakes)
(N)ew or (M)odified from bank (≥ 1)
(P)revious 2 exams (≤ 1; randomly selected)

Unit 1 2016 NRC Exam

ADMIN JPM

A1

UNIT: 1 REV # 1 DATE: ____________________

TUOI NUMBER: A1JPM-NRC-WHHR (A1/A5)

SYSTEM/DUTY AREA: ADMINISTRATIVE TOPIC – CONDUCT OF OPERATIONS

TASK: PERFORM WORKING HOUR HISTORY REVIEW AND SELECT ELIGIBLE OPERATORS TO FILL VACANCY DUE TO ILLNESS OF THE ONCOMING ATC WATCH

JTA#: ANO-RO-ADMIN-NORM-195/ANO-SRO-ADMIN-NORM-191

KA VALUE RO: 2.9 SRO: 3.9 KA REFERENCE: 2.1.5

APPROVED FOR ADMINISTRATION TO: RO: X SRO: X

TASK LOCATION: INSIDE CR:______ OUTSIDE CR:_______ BOTH: X

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE:__________ SIMULATOR:____________ CLASSROOM: PERFORM

POSITION EVALUATED: RO:__________ SRO:___________

ACTUAL TESTING ENVIRONMENT: SIMULATOR:_________ PLANT SITE:______ CLASSROOM:_____

TESTING METHOD: SIMULATE:_________ PERFORM:___________

APPROXIMATE COMPLETION TIME IN MINUTES: 15 MINUTES

REFERENCE(S): EN-OM-123

EXAMINEE'S NAME:______________________________ Logon ID: ___________________

EVALUATOR'S NAME:____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY:________________ UNSATISFACTORY:_________________

PERFORMANCE CHECKLIST COMMENTS:

____

____

____

____________ Start Time ____________ Stop Time ____________ Total Time

SIGNED ________________________________ DATE: _______________________

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:

The examiner should verify that the examinee has been briefed on the JPM Examination Briefing Sheet EN-TQ-114 Attachment 9.5 or NUREG-1021 App. E.

JPM INITIAL TASK CONDITIONS: The plant is at 100% power operations. The scheduled day-shift oncoming ATC operator has called in and stated he will not be able to come in to take the ATC watch due to an illness. The 54 hour rolling average working limits in the last six weeks are met. PQ&S Computer program is not available.

TASK STANDARD: The examinee has correctly selected operators A, C, D, and E ~~A, C and E~~ that are available to come in to fill the 12 hour dayshift ATC watch vacancy in accordance with the work hour limits for covered individuals and correctly stated why operator~~s~~ B ~~and D~~ cannot come in.

TASK PERFORMANCE AIDS: Working Hour History for the last 14 days for Operators A,B,C,D, and E

INITIATING CUE:

The Shift Manager has directed you to review the given work history of five eligible qualified operators and determine which one(s) would be available to fill the ATC vacancy for the upcoming 12 hour day-shift in accordance with the Fatigue Management Program. Explain why any operator may be ineligible to fill the vacancy if any cannot.

CRITICAL ELEMENTS (C):_________

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UNSAT	N/A
NOTE: Provide examinee with a copy of the work history or the five eligible candidates.					
(C)	1. Review working hour history for Operator 'A'.	Determines that Operator 'A' is eligible to fill the oncoming ATC watch vacancy without exceeding any working hour limits.	_____	_____	_____
(C)	2. Review working hour history for Operator 'B'.	Determines that Operator 'B' is NOT eligible to fill the oncoming ATC watch vacancy because the operator will exceed the "Maximum of 72 work hours in any 7 day period" working hour limit.	_____	_____	_____
(C)	3. Review working hour history for Operator 'C'.	Determines that Operator 'C' is eligible to fill the oncoming ATC watch vacancy without exceeding any working hour limits. .	_____	_____	_____
(C)	4. Review working hour history for Operator 'D'.	Determines that Operator 'D' is ~~NOT~~ eligible to fill the oncoming ATC watch vacancy ~~because the operator will not have had a "Minimum 34 hour break in any 9 day period" working hour limit.~~	_____	_____	_____
(C)	5. Review working hour history for Operator 'E'.	Determines that Operator 'E' is eligible to fill the oncoming ATC watch vacancy without exceeding any working hour limits.	_____	_____	_____
NOTE: Inform examinee that JPM is complete.					

END

EXAMINER ANSWER KEY

Operator	Eligible/Not Eligible	Reason (if not eligible)
Operator A	Eligible (C)	
Operator B	Not Eligible (C)	Will Exceed 72 hours in a 7 day period. (C)
Operator C	Eligible (C)	
Operator D	~~Not~~ Eligible (C)	~~No 34 hour break in a 9 day period. (C)~~
Operator E	Eligible (C)	

EXAMINEE'S COPY

JPM INITIAL TASK CONDITIONS:

- The plant is at 100% power operations.
- The scheduled day-shift oncoming ATC operator has called in and stated he will not be able to come in to take the ATC watch due to an illness.
- The 54 hour rolling average working limits in the last six weeks are met.
- PQ&S computer program is not available.

INITIATING CUE:

The Shift Manager has directed you to review the given work history of five eligible qualified operators and determine which one(s) would be available to fill the ATC vacancy for the upcoming 12 hour day-shift in accordance with the Fatigue Management Program.

Explain why any operator may be ineligible to fill the vacancy if any cannot.

EXAMINEE'S COPY

Operator	Eligible/Not Eligible	Reason (if not eligible)
Operator A		
Operator B		
Operator C		
Operator D		
Operator E		

Operator A		14 Day work hour history for a covered worker 'A'. In the following Table Day 1 is Today, Day 2 is Yesterday, etc.											
DAY	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Shift Schedule	D	OFF	OFF	OFF	N	N	N	OFF	OFF	D	D	D	D	
Hours Worked	12				12	12	12			12	12	12	12	
														TODAY

For Shift Schedule 'D' is for day-shift schedule, 'N' is for night-hift schedule
Reference EN-OM-123

Operator B		14 Day work hour history for a covered worker 'B'. In the following Table Day 1 is Today, Day 2 is Yesterday, etc.											
DAY	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Shift Schedule	OFF	D	D	OFF	OFF	OFF	OFF	N	N	N	N	N	N	
Hours Worked		12	12					12	12	12	12	12	12	
														TODAY

For Shift Schedule 'D' is for day-shift schedule, 'N' is for night-hift schedule
Reference EN-OM-123

Operator C		14 Day work hour history for a covered worker 'C'. In the following Table Day 1 is Today, Day 2 is Yesterday, etc.											
DAY	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Shift Schedule	OFF	OFF	D	D	D	D	Off	OFF	N	N	N	N	Off	
Hours Worked			12	12	12	12			12	12	12	12		
														TODAY

For Shift Schedule 'D' is for day-shift schedule, 'N' is for night-hift schedule
Reference EN-OM-123

Operator D		14 Day work hour history for a covered worker 'D'. In the following Table Day 1 is Today, Day 2 is Yesterday, etc.											
DAY	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Shift Schedule	N	OFF	OFF	OFF	D	D	D	OFF	D	D	D	D	D	
Hours Worked	12				12	12	12		12	12	12	12	12	
														TODAY

For Shift Schedule 'D' is for day-shift schedule, 'N' is for night-hift schedule
Reference EN-OM-123

Operator E		14 Day work hour history for a covered worker 'E'. In the following Table Day 1 is Today, Day 2 is Yesterday, etc.											
DAY	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Shift Schedule	D	D	OFF	OFF	OFF	N	N	N	OFF	OFF	D	D	D	
Hours Worked	12	12				12	12	12			12	12	12	
														TODAY

For Shift Schedule 'D' is for day-shift schedule, 'N' is for night-hift schedule
Reference EN-OM-123

Unit 1 2016 NRC Exam

ADMIN JPM

A2

UNIT: 1 REV #: 2 DATE: ____________

SYSTEM/DUTY AREA: Conduct of Operations

TASK: Perform Spent Fuel Pool Makeup Calculation.

JTA#: ANO1-RO-SFC-NORM-17

KA VALUE RO: 4.6 SRO: 4.6 KA REFERENCE: 2.1.20

APPROVED FOR ADMINISTRATION TO: RO: X SRO: x

TASK LOCATION: INSIDE CR: ____ OUTSIDE CR: ____ BOTH: X

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE: ____________ SIMULATOR: ____________ Classroom: Perform

POSITION EVALUATED: RO: ____________ SRO: ____________

ACTUAL TESTING ENVIRONMENT: SIMULATOR: ____ PLANT SITE: ____ Classroom: ____

TESTING METHOD: SIMULATE: ____ PERFORM: X

APPROXIMATE COMPLETION TIME IN MINUTES: 20 Minutes

REFERENCE(S): 1104.003, Att. C2

EXAMINEE'S NAME: ____________________ Logon ID: ____________

EVALUATOR'S NAME: ____________________

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY: ____________ UNSATISFACTORY: ____________

PERFORMANCE CHECKLIST COMMENTS:

____

____

Start Time ________ Stop Time ________ Total Time ________

SIGNED: ____________________ DATE: ____________

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:

The examiner shall ensure that the examinee has been briefed on the JPM Examination Briefing Sheet EN-TQ-114 Attachment 9.5 or NUREG 1021 Appendix E.

JPM INITIAL TASK CONDITIONS:

Given the following Plant conditions:

- Plant is in refueling Outage 1R26
- SF Pool level is -0.4 ft.
- SF Pool Boron concentration 2300 ppm.
- BAAT Boron concentration 12,250 ppm.
- Tilt Pit and Cask Pit gates are removed.
- Fuel Transfer Tube Isolation SF-45 is Closed

TASK STANDARD:

Determined initial SF Pool volume is 362,843 gallons from Table 2.

Determined feed volume to be 3684 ± 2 gallons.

Determined final SF Pool volume to be 366,527 ± 5 gallons.

Determined final SF Pool level is 0.0 to -0.1 ft.

TASK PERFORMANCE AIDS:

1104.003, Attachment C2

SIMULATOR SETUP:

NA

EXAMINER'S NOTES:

INITIATING CUE:
CRS directs you to perform 1104.003, Chemical Addition, Attachment C2, for makeup to SFP to raise Boron concentration to 2400 ppm. Determine amount of Boric Acid volume needed. Determine final SFP Volume and Level.

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
(C)	1.	Determine initial SF Pool volume from Table 2.	Determined volume is 362,843 gallons from Table 2.	SAT UNSAT N/A
	2.	Record data.	Recorded data.	SAT UNSAT N/A
(C)	3.	Determine feed volume to be added to SF Pool.	Determined feed volume to be 3684 ± 2 gallons.	SAT UNSAT N/A
(C)	4.	Determine final SF Pool volume.	Determined final SF Pool volume to be 366,527 ± 5 gallons.	SAT UNSAT N/A
(C)	5	Determine final SF Pool level	Determined final SF Pool level is from 0.0 to -0.1 ft.	SAT UNSAT N/A
END				

ANSWER KEY

JPM INITIAL TASK CONDITIONS:

Given the following Plant conditions:

- Plant is in Refueling Outage 1R26.
- SF Pool level is -0.4 ft.
- SF Pool Boron concentration 2300 ppm.
- BAAT Boron concentration 12,250 ppm.
- Tilt Pit and Cask Pit gates are removed.
- Fuel Transfer Tube Isolation SF-45 is Closed

INITIATING CUE:

CRS directs you to perform 1104.003, Chemical Addition, Attachment C2, for makeup to SFP to raise Boron concentration to 2400 ppm.
Determine amount of Boric Acid volume needed.
Determine final SF Pool volume.
Determine final SF Pool level.

Document the results of the review below:

(C) Determined initial SF Pool volume is currently 362,843 gallons from Table 2.

(C) Determined feed volume to be 3684 ± 2 gallons.

(C) Determined final SF Pool volume to be 366,527 ± 5 gallons.

(C) Determined final SF Pool level is from 0.0 to -0.1 ft.

Final Level interpolation:

$$\frac{(366{,}692 - 365730)}{(366{,}692 - 366527)} = \frac{-0.1}{X}$$

$$X = \frac{-0.1\ (165)}{962} = -0.017 \text{ feet}$$

Final Level = - 0.017

EXAMINEEE'S COPY

JPM INITIAL TASK CONDITIONS:

Given the following Plant conditions:

- Plant is in Refueling Outage 1R26.
- SF Pool level is -0.4 ft.
- SF Pool Boron concentration 2300 ppm.
- BAAT Boron concentration 12,250 ppm.
- Tilt Pit and Cask Pit gates are removed.
- Fuel Transfer Tube Isolation SF-45 is Closed

INITIATING CUE:

CRS directs you to perform 1104.003, Chemical Addition, Attachment C2, for makeup to SF Pool to raise Boron concentration to 2400 ppm.
Determine amount of Boric Acid volume needed.
Determine final SF Pool volume.
Determine final SF Pool level.

Document the results of the review below:

____

____

____

____

____

____

____

____

ATTACHMENT C2

SF POOL FEED CALCULATIONS

TABLE 1
Spent Fuel Pool and Systems Volume/Ft Depth

SF Pool (gal/ft)	SF Pool + Cask Pit (gal/ft)	SF Pool + Tilt Pit (gal/ft)	SF Pool + Cask Pit + Tilt Pit (gal/ft)	Refueling Canal (gal/ft)	Incore Tank (gal/ft)
7,570	8,349	8,845	9,624	11,070	1,141

TABLE 2
Spent Fuel Pool and Systems Volume (gallons)

Elev. (ft)	LI-2004	SF Pool	SF Pool + Cask Pit	SF Pool + Tilt Pit (1)	SF Pool + Cask Pit + Tilt Pit (1)	Refueling Canal	Incore Tank
401.5	+1.0 ft	298,120	330,899	343,537	376,316	During refueling, canal level must be maintained between -0.5 and 0.0 on the SFP Level indicator (LI-2004).	
401.4	+0.9 ft	297,363	330,064	342,653	375,354		
401.3	+0.8 ft	296,606	329,229	341,768	374,392		
401.2	+0.7 ft	295,849	328,394	340,884	373,429		
401.1	+0.6 ft	295,092	327,559	339,999	372,467		
401.0	+0.5 ft	294,335	326,725	339,115	371,504		
400.9	+0.4 ft	293,578	325,890	338,230	370,542		
400.8	+0.3 ft	292,821	325,055	337,346	369,580		
400.7	+0.2 ft	292,064	324,220	336,461	368,617		
400.6	+0.1 ft	291,307	323,385	335,577	367,655		
400.5	0.0 ft	290,550	322,550	334,692	366,692	342,800	27,400
400.4	-0.1 ft	289,793	321,715	333,808	365,730	341,693	27,286
400.3	-0.2 ft	289,036	320,880	332,923	364,768	340,586	27,172
400.2	-0.3 ft	288,279	320,045	332,039	363,805	339,479	27,058
400.1	-0.4 ft	287,522	319,210	331,154	362,843	338,372	26,944
400.0	-0.5 ft	286,765	318,376	330,270	361,880	337,265	26,830
399.9	-0.6 ft	286,008	317,541	329,385	360,918	336,158	26,715
399.8	-0.7 ft	285,251	316,706	328,501	359,956	335,051	26,601
399.7	-0.8 ft	284,494	315,871	327,616	358,993	333,944	26,487
399.6	-0.9 ft	283,737	315,036	326,732	358,031	332,837	26,373
399.5	-1.0 ft	282,980	314,201	325,847	357,068	331,730	26,259
399.4	-1.1 ft	282,223	313,366	324,963	356,106	330,623	26,145
399.3	-1.2 ft	281,466	312,531	324,078	355,143	329,516	26,031
399.2	-1.3 ft	280,709	311,696	323,194	354,181	328,409	25,917
399.1	-1.4 ft	279,952	310,861	322,309	353,219	327,302	25,803
399.0	-1.5 ft	279,195	310,026	321,425	352,256	326,195	25,689

(1) Tilt Pit volume from CR-ANO-1-2008-1859-CA2.

CAUTION

Performance of this section requires verification that feed volume will not result in overflowing of the SFP or other attached volumes.

NOTE

- It is necessary to coordinate with Dry Fuel Personnel when making up to the Spent Fuel Pool during Dry Fuel Operations.
- Step 1.0 is solely performed to determine volume of boric acid at a known concentration to achieve a desired final SFP boron concentration, and generally would not be used.

1.0 IF it is desired to calculate the volume of boric acid required to achieve a desired final SFP concentration,
THEN perform the following:

1.1 Determine initial SF Pool volume from TABLE 2. Interpolate if necessary.

1.1.1 IF appropriate,
THEN add Refueling Canal and Incore Tank volume.

V_i = ______________gal = Initial Volume from TABLE 2

1.2 Record the following data:

C_i = ___________ppmB = Initial SF Pool concentration

C_f = ___________ppmB = Final desired SF Pool concentration

C_{fd} = ___________ppmB = Feed concentration to be added to SF Pool

1.3 Determine feed volume to be added to the SF Pool

$$V_{fd} = \frac{(V_i) \times (C_f - C_i)}{(C_{fd} - C_f)}$$

$$V_{fd} = \frac{(\qquad) \times (\qquad - \qquad)}{(\_\_\_\_\_\_ - \_\_\_\_\_\_)}$$

V_{fd} = ___________gal.

ATTACHMENT C2

1.4 Determine final SF Pool volume

Final volume = (V_{fd}) + (V_i)

Final volume = ( ) + ( )

Final Volume = __________gal.

NOTE

If final SF Pool level is determined to be greater than +1.0 ft or greater than zero when refueling, then the addition will have to be made in separate operations.

1.5 Determine final SF Pool level from TABLE 2, interpolate as necessary.

1.5.1 IF final volume greater than table values THEN a second addition will have to be done following a level reduction.

1.6 Perform the other sections of this Attachment as required.

2.0 IF needed,

THEN find the volume of feed (V_{fd}) AND use TABLE 1 for SF Pool gal/ft.
IF Refueling Canal or Incore Tank is connected to SF Cooling System
THEN add the appropriate gal/ft to the SF Pool gal/ft.

V_{fd} = [(Final level) - (Initial level)] x (gal/ft)

V_{fd} = [(________ft.) - (__________ft.)] x (________gal/ft)

V_{fd} = __________gal.

ATTACHMENT C2

SF POOL FEED CALCULATIONS

TABLE 1 Spent Fuel Pool and Systems Volume/Ft Depth					
SF Pool (gal/ft)	SF Pool + Cask Pit (gal/ft)	SF Pool + Tilt Pit (gal/ft)	SF Pool + Cask Pit + Tilt Pit (gal/ft)	Refueling Canal (gal/ft)	Incore Tank (gal/ft)
7,570	8,349	8,845	9,624	11,070	1,141

TABLE 2 Spent Fuel Pool and Systems Volume (gallons)							
Elev. (ft)	LI-2004	SF Pool	SF Pool + Cask Pit	SF Pool + Tilt Pit (1)	SF Pool + Cask Pit + Tilt Pit (1)	Refueling Canal	Incore Tank
401.5	+1.0 ft	298,120	330,899	343,537	376,316	During refueling, canal level must be maintained between -0.5 and 0.0 on the SFP Level indicator (LI-2004).	
401.4	+0.9 ft	297,363	330,064	342,653	375,354		
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401.0	+0.5 ft	294,335	326,725	339,115	371,504		
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400.3	-0.2 ft	289,036	320,880	332,923	364,768	340,586	27,172
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399.8	-0.7 ft	285,251	316,706	328,501	359,956	335,051	26,601
399.7	-0.8 ft	284,494	315,871	327,616	358,993	333,944	26,487
399.6	-0.9 ft	283,737	315,036	326,732	358,031	332,837	26,373
399.5	-1.0 ft	282,980	314,201	325,847	357,068	331,730	26,259
399.4	-1.1 ft	282,223	313,366	324,963	356,106	330,623	26,145
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399.1	-1.4 ft	279,952	310,861	322,309	353,219	327,302	25,803
399.0	-1.5 ft	279,195	310,026	321,425	352,256	326,195	25,689

(1) Tilt Pit volume from CR-ANO-1-2008-1859-CA2.

Initial Volume

$$\frac{(366{,}692 - 365{,}730)}{(366{,}692 - 366{,}527)} = \frac{(-0.1)}{X} \qquad \frac{962}{165} = \frac{-0.1}{X}$$

$X = -0.017$ feet

CAUTION

Performance of this section requires verification that feed volume will not result in overflowing of the SFP or other attached volumes.

NOTE

- It is necessary to coordinate with Dry Fuel Personnel when making up to the Spent Fuel Pool during Dry Fuel Operations.
- Step 1.0 is solely performed to determine volume of boric acid at a known concentration to achieve a desired final SFP boron concentration, and generally would not be used.

1.0 IF it is desired to calculate the volume of boric acid required to achieve a desired final SFP concentration, THEN perform the following:

1.1 Determine initial SF Pool volume from TABLE 2. Interpolate if necessary.

1.1.1 IF appropriate, THEN add Refueling Canal and Incore Tank volume.

V_i = 362,843 gal = Initial Volume from TABLE 2

1.2 Record the following data:

C_i = 2300 ppmB = Initial SF Pool concentration

C_f = 2400 ppmB = Final desired SF Pool concentration

C_{fd} = 12,250 ppmB = Feed concentration to be added to SF Pool

1.3 Determine feed volume to be added to the SF Pool

$$V_{fd} = \frac{(V_i) \times (C_f - C_i)}{(C_{fd} - C_f)}$$

$$V_{fd} = \frac{(362{,}843) \times (2400 - 2300)}{(12{,}250 - 2400)}$$

$$\boxed{V_{fd} = 3683.7 \text{ gal.}}$$

ATTACHMENT C2

1.4 Determine final SF Pool volume

Final volume = (V_{fd}) + (V_i)

Final volume = (3683.7) + (362,843)

Final Volume = 366,527 gal.

NOTE

If final SF Pool level is determined to be greater than +1.0 ft or greater than zero when refueling, then the addition will have to be made in separate operations.

1.5 Determine final SF Pool level from TABLE 2, interpolate as necessary.

N/A 1.5.1 IF final volume greater than table values THEN a second addition will have to be done following a level reduction.

N/A 1.6 Perform the other sections of this Attachment as required.

N/A 2.0 IF needed,
THEN find the volume of feed (V_{fd}) AND use TABLE 1 for SF Pool gal/ft.
IF Refueling Canal or Incore Tank is connected to SF Cooling System
THEN add the appropriate gal/ft to the SF Pool gal/ft.

V_{fd} = [(Final level) - (Initial level)] x (gal/ft)

V_{fd} = [(N/A ft.) - (N/A ft.)] x (N/A gal/ft)

V_{fd} = N/A gal.

Unit 1 2016 NRC Exam

ADMIN JPM

A3

UNIT: 1 REV # 2 DATE: ______________________________

TUOI NUMBER: A1JPM-RO-HCRD5 (A3)

SYSTEM/DUTY AREA: ADMINISTRATIVE TOPIC – EQUIPMENT CONTROL

TASK: PERFORM IDENTIFICATION OF COMPONENTS THAT NEED TO BE ISOLATED AND DANGER TAGGED FOR AN INBOARD SEAL LEAK ON MAKEUP PURIFICATION PUMP P-36A

JTA#: ANO-RO-ADMIN-NORM-078

KA VALUE RO: 4.1 SRO: 4.3 KA REFERENCE: 2.2.13

APPROVED FOR ADMINISTRATION TO: RO: X SRO:__________

TASK LOCATION: INSIDE CR:______ OUTSIDE CR:_______ BOTH: X

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE:_________ SIMULATOR:__________ CLASSROOM: PERFORM

POSITION EVALUATED: RO: : X SRO:___________

ACTUAL TESTING ENVIRONMENT: SIMULATOR:____ PLANT SITE:_____ CLASSROOM: X

TESTING METHOD: SIMULATE:_________ PERFORM: X

APPROXIMATE COMPLETION TIME IN MINUTES: 15 MINUTES

REFERENCE(S): EN-OP-102, PROTECTIVE AND CAUTION TAGGING; P&ID M-231;

ELECTRICAL PRINT E-5 ONE LINE DRAWING FOR ENGINEERED SAFEGUARD BUSES A3 AND A4.

EXAMINEE'S NAME:________________________________ Logon ID: ____________________

EVALUATOR'S NAME:____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY:________________ UNSATISFACTORY:_________________

PERFORMANCE CHECKLIST COMMENTS:

____

____

____

____________ Start Time ____________ Stop Time ____________ Total Time

SIGNED __________________________________ DATE: _______________________

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:

The examiner should verify that the examinee has been briefed on the JPM Examination Briefing Sheet EN-TQ-114 Attachment 9.5 or NUREG-1021 App. E.

JPM INITIAL TASK CONDITIONS: The plant is at 100% power. A bad inboard seal leak is present on Makeup Purification Pump P-36A. A Danger Tag will need to be generated to isolate this inboard seal leak. No venting or draining of the pump is required at this time.

TASK STANDARD: The applicant identified the following components at a minimum for danger tagging. A-306 – Racked Down, MU-20A – Closed, MU-21A – Closed, MU-18A - Closed.

TASK PERFORMANCE AIDS: P&ID M-231 Makeup & Purification System Drawing; Electrical Print E-5 one line drawing for Engineered Safeguard Buses A3 and A4.

INITIATING CUE:

The SM/CRS has directed you to identify the components that need to be danger tagged to electrically and mechanically isolate Makeup Purification Pump P-36A to isolate this seal leak. Also provide the component danger tag position required.

CRITICAL ELEMENTS (C):_________

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UNSAT	N/A
NOTE: Provide examinee with a copy of E-Print E-5 and P&ID M-231					
(C)	1. Reviews controlled documentation to determine source of power to P-36A to add to the tagout (E-Print E-5 or OP-1107.002 Attachment A)	Determines that Electrical Circuit Breaker **A-306** will need to be **"Breaker Racked Down"** and added to the tagout.	_____	_____	_____
Note: The Candidate may add a Caution Tag to be placed on the MU Purification Pump P-36A Remote Hand Switch.					
(C)	2. Reviews controlled documentation to determine the P-36A pump discharge Isolation will need to be added to the tagout (P&ID M-231)	Determines that P-36A Discharge Isolation **MU-20A** will need to be **Closed** and added to the tagout.	_____	_____	_____
(C)	3. Reviews controlled documentation to determine that a P-36A minimum recirc isolation will need to be added to the tagout (P&ID M-231)	Determines that a P-36A Minimum Recirc Isolation **MU 21A or MU-22A** (in series) will need to be **Closed** and added to the tagout.	_____	_____	_____
(C)	4. Reviews controlled documentation to determine the P-36A pump suction Isolation will need to be added to the tagout (P&ID M-231)	Determines that P-36A Suction Isolation **MU-18A** will need to be **Closed** and added to the tagout.	_____	_____	_____
NOTE: Inform examinee that JPM is complete.					

END

EXAMINER ANSWER KEY

Component #	Component Name	Component Position
A-306	MU Pump P-36A Electrical Circuit Breaker	Breaker Racked Down
MU-20A	MU Pump P-36A Discharge Isolation Valve	Closed
MU-21A	MU Pump P-36A Minimum Recirc Isolation Valve	Closed
MU-18A	MU Pump P-36A Suction Isolation Valve	Closed

EXAMINEE'S COPY

JPM INITIAL TASK CONDITIONS:

- The plant is at 100% power.
- A bad inboard seal leak is present on Makeup Purification Pump P-36A.
- A Danger Tag will need to be generated to isolate this inboard seal leak.
- No venting or draining of the pump is required at this time.

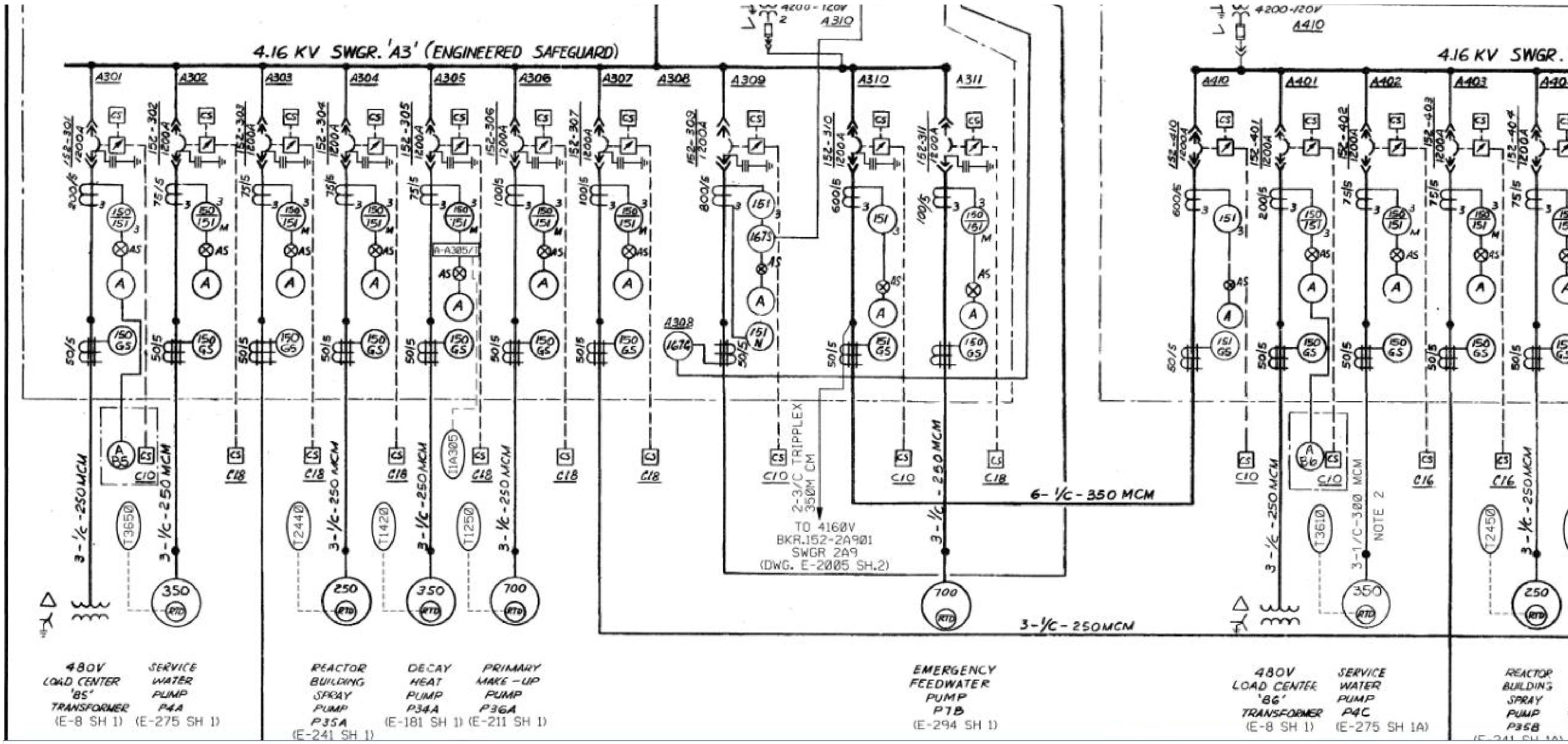
INITIATING CUE:

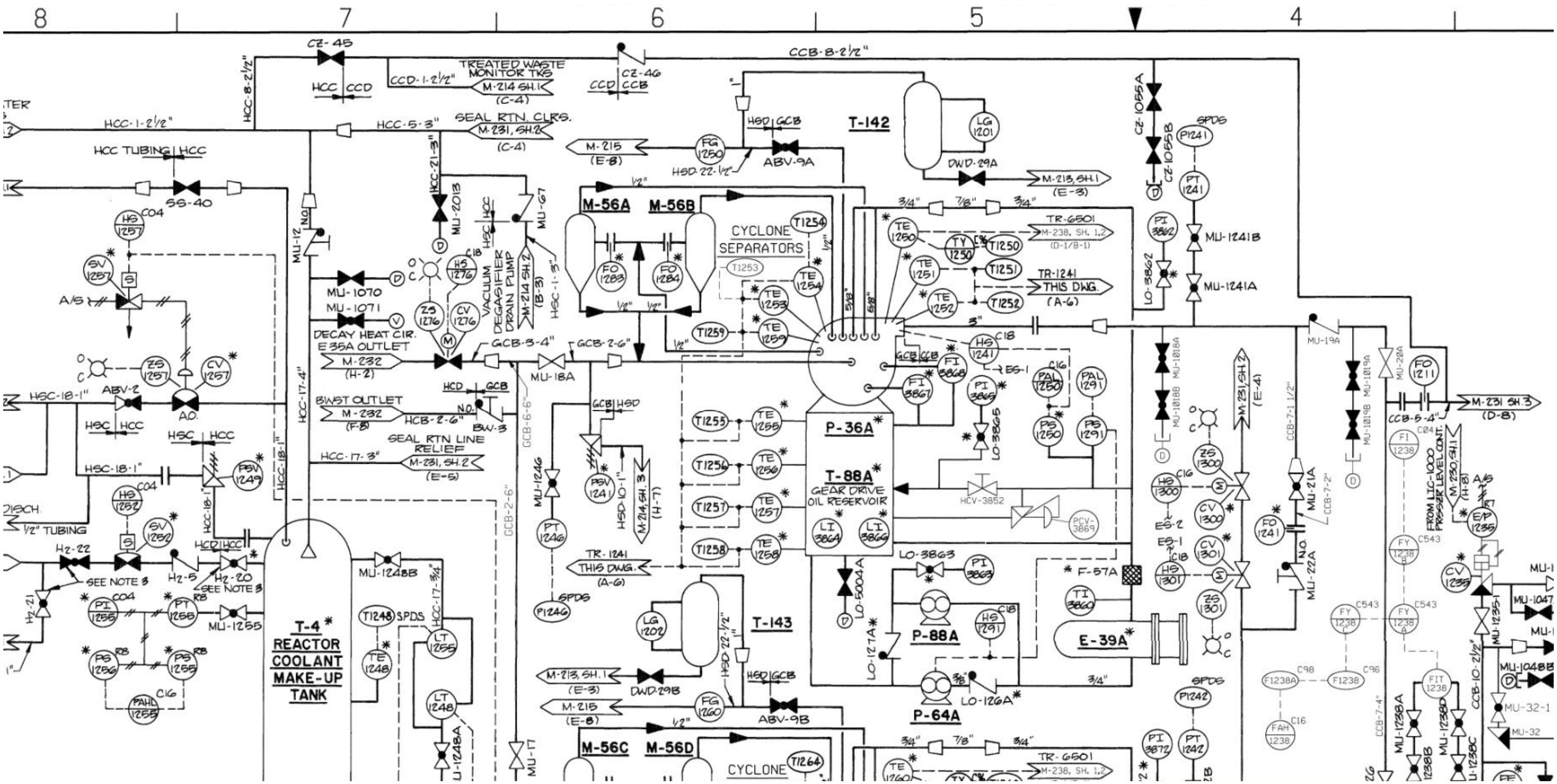
The SM/CRS has directed you to identify the components that need to be danger tagged to electrically and mechanically isolate Makeup Purification Pump P-36A to isolate the seal leak.

Also provide the component danger tag position required.

EXAMINEE'S COPY

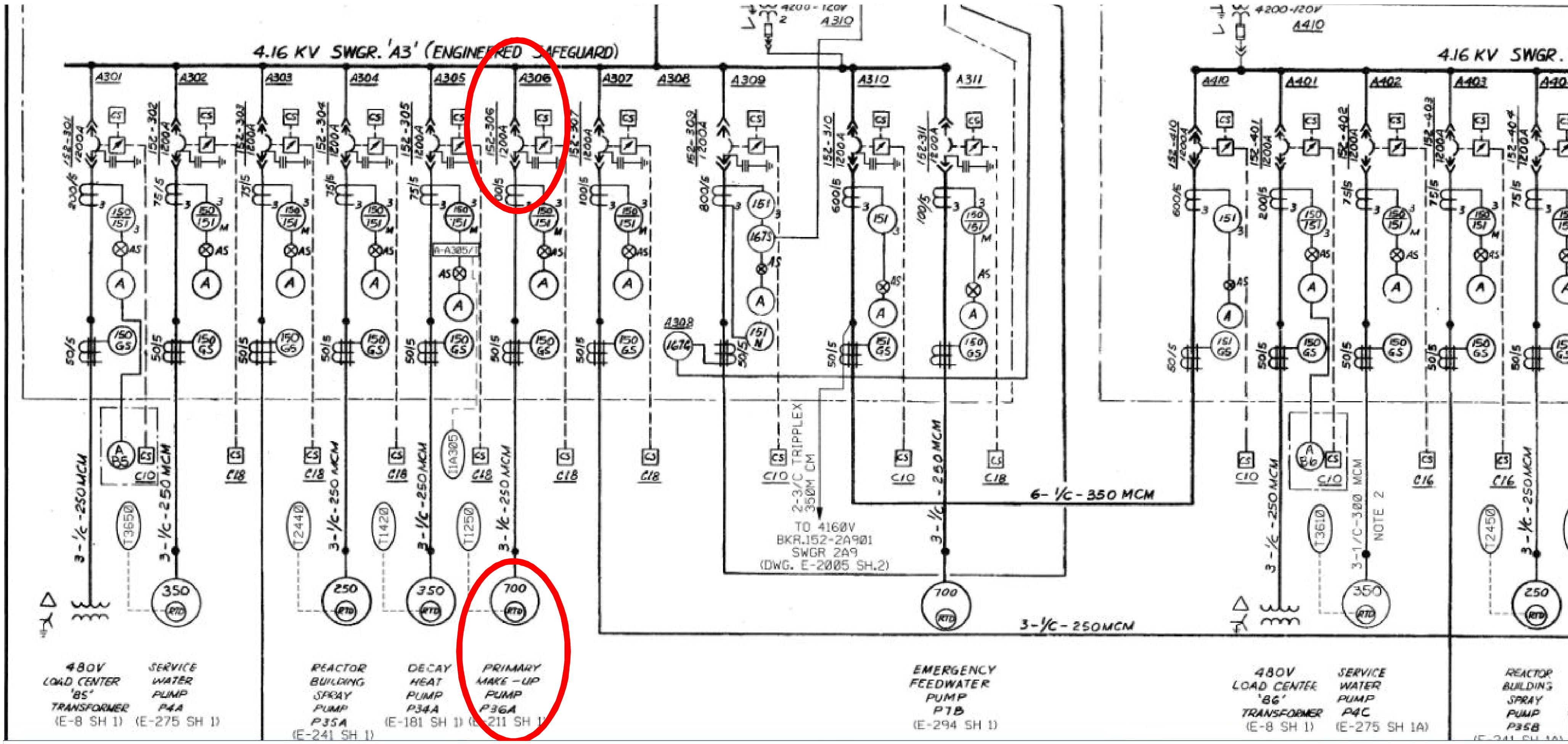
Component #	Component Name	Danger Tag Position


4.16 KV SWGR. 'A3' (ENGINEERED SAFEGUARD)
4.16 KV SWGR.
480V LOAD CENTER 'B5' TRANSFORMER (E-8 SH 1)
SERVICE WATER PUMP P4A (E-275 SH 1)
REACTOR BUILDING SPRAY PUMP P35A (E-241 SH 1)
DECAY HEAT PUMP P34A (E-181 SH 1)
PRIMARY MAKE-UP PUMP P36A (E-211 SH 1)
EMERGENCY FEEDWATER PUMP P7B (E-294 SH 1)
480V LOAD CENTER 'B6' TRANSFORMER (E-8 SH 1)
SERVICE WATER PUMP P4C (E-275 SH 1A)
REACTOR BUILDING SPRAY PUMP P35B
TO 4160V BKR.152-2A901 SWGR 2A9 (DWG. E-2005 SH.2)
2-3/C TRIPPLEX 350M CM
6-1/C-350 MCM
3-1/C-250MCM
3-1/C-300 MCM
NOTE 2

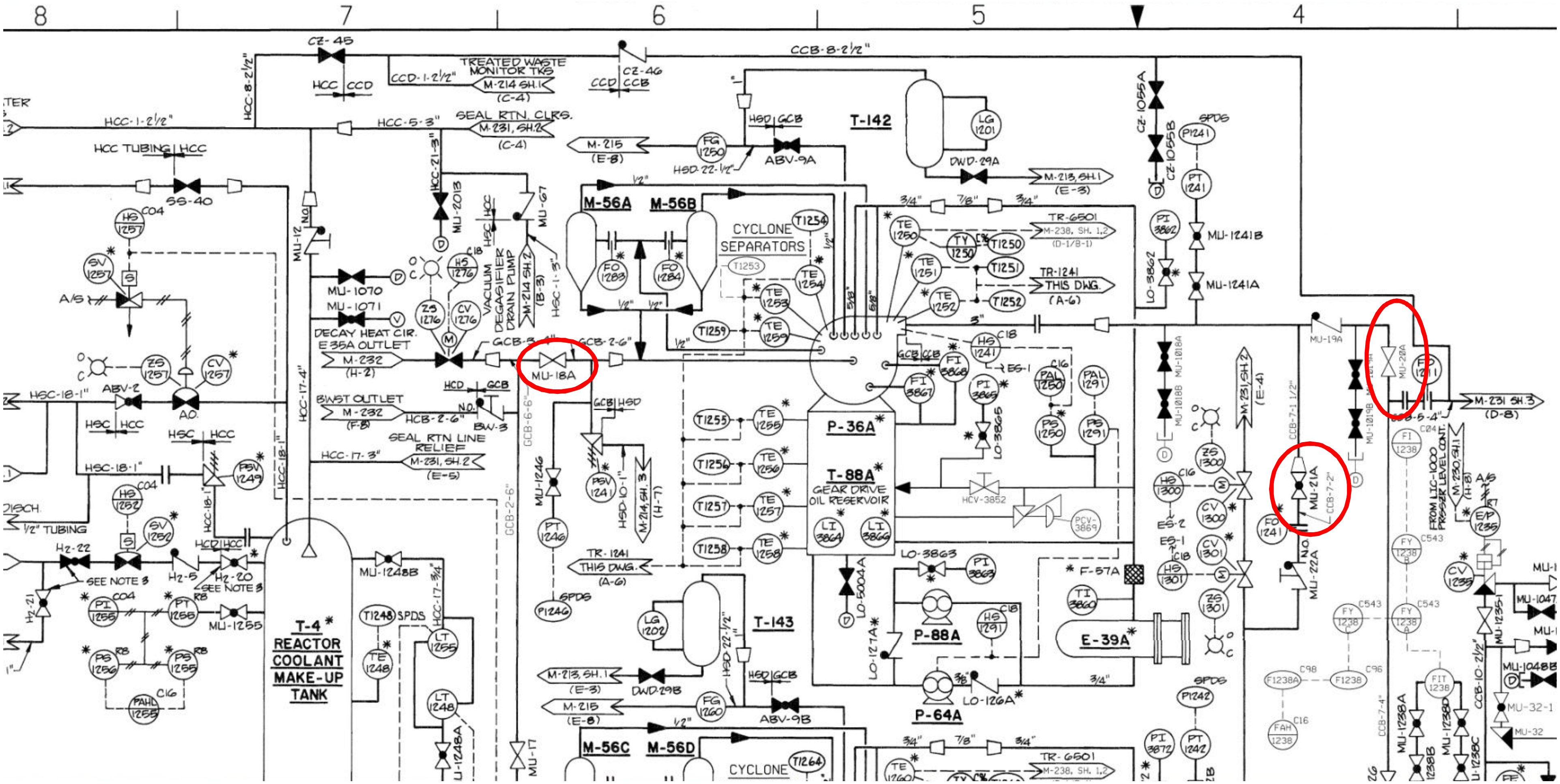


8
7
6
5
4
CZ-45
CCB-8-2½"
HCC-8-2½"
TREATED WASTE MONITOR TKS
M-214 SH.1 (C-4)
CCD-1-2½"
CZ-46
HCC-1-2½"
HCC-5-3"
SEAL RTN. CLRS.
M-231, SH.2 (C-4)
HCC TUBING HCC
SS-40
M-215 (E-8)
ABV-9A
T-142
DWD-29A
M-213, SH.1 (E-3)
CZ-1055A
CZ-1055B
M-56A
M-56B
CYCLONE SEPARATORS
TR-6501
M-238, SH. 1,2 (D-1/B-1)
TR-1241 THIS DWG. (A-6)
MU-1241B
MU-1241A
MU-1070
MU-1071
DECAY HEAT CIR. E35A OUTLET
M-232 (H-2)
VACUUM DEGASIFIER DRAIN PUMP
M-214 SH.2 (B-3)
GCB-3-4"
GCB-2-6"
MU-18A
BWST OUTLET
M-232 (F-8)
HCB-2-6"
BW-3
SEAL RTN LINE RELIEF
M-231, SH.2 (E-5)
HCC-17-3"
HSC-18-1"
ABV-2
A.O.
P-36A
T-88A
GEAR DRIVE OIL RESERVOIR
HCV-3852
PCV-3869
M-231, SH.2 (E-4)
MU-19A
MU-20A
M-231 SH.3 (D-8)
CCB-5-4"
FROM LIC-1000 PRESSR LEVEL CONT.
M-230, SH.1 (H-8)
TR-1241 THIS DWG. (A-6)
LO-3863
F-57A
E-39A
P-88A
P-64A
LO-126A
LO-127A
LO-5004A
T-4
REACTOR COOLANT MAKE-UP TANK
MU-1248B
MU-1255
SEE NOTE 3
T-143
M-213, SH.1 (E-3)
DWD-29B
M-215 (E-8)
ABV-9B
M-56C
M-56D
CYCLONE
TR-6501
M-238, SH. 1,2
MU-21A
MU-22A
MU-1238A
MU-1238B
MU-1238C
MU-1047
MU-1048B
MU-32-1
MU-32

M-231, sh. 1



EPrint E-5 Sheet 1



8
7
6
5
4
CZ-45
TREATED WASTE MONITOR TKS
M-214 SH.1
(C-4)
CZ-46
CCB-8-2½"
HCC-1-2½"
HCC-5-3"
SEAL RTN. CLRS.
M-231, SH.2
(C-4)
HCC TUBING
SS-40
M-215
(E-8)
ABV-9A
T-142
DWD-29A
M-213, SH.1
(E-3)
M-56A
M-56B
CYCLONE SEPARATORS
MU-1070
MU-1071
DECAY HEAT CIR. E35A OUTLET
M-232
(H-2)
VACUUM DEGASIFIER DRAIN PUMP
M-214 SH.2
(B-3)
MU-18A
TR-6501
M-238, SH. 1,2
TR-1241
THIS DWG.
(A-6)
MU-1241B
MU-1241A
MU-19A
MU-20A
M-231 SH.3
(D-8)
ABV-2
BWST OUTLET
M-232
(F-8)
HCB-2-6"
BW-3
SEAL RTN LINE RELIEF
M-231, SH.2
(E-5)
HSC-18-1"
P-36A
T-88A
GEAR DRIVE OIL RESERVOIR
HCV-3852
M-231, SH.2
(E-4)
MU-21A
MU-22A
FROM LIC-1000 PRESSER LEVEL CONT.
½" TUBING
SEE NOTE 3
MU-1255
T-4
REACTOR COOLANT MAKE-UP TANK
MU-1248B
TR-1241
THIS DWG.
(A-6)
T-143
LO-3863
F-57A
P-88A
E-39A
P-64A
LO-126A
M-213, SH.1
(E-3)
DWD-29B
M-215
(E-8)
ABV-9B
M-56C
M-56D
CYCLONE
TR-6501
M-238, SH. 1,2

M-231, sh. 1

Unit 1 2016 NRC Exam

ADMIN JPM

A4

A1JPM-RO-ADMIN-RWP3 (A4)

ADMINISTRATIVE JOB PERFORMANCE MEASURE

UNIT: 1 REV # 1 DATE: **8/4/2016**

JPM ID: A1JPM-RO-ADMIN-RWP3 (A4)

SYSTEM/DUTY AREA: ADMINISTRATIVE TOPIC – Radiation Control

TASK: Ability to comply with radiation work permit requirements

JTA#: ANO1-RO-DHR-NORM-2

KA VALUE RO: 3.5 SRO: 3.6 KA REFERENCE: 2.3.7

APPROVED FOR ADMINISTRATION TO: RO: X SRO: ____

TASK LOCATION: INSIDE CR: ____ OUTSIDE CR: ____ CLASSROOM: X

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE: ____ SIMULATOR: ____ Classroom: X

POSITION EVALUATED: RO: X SRO: ____

ACTUAL TESTING ENVIRONMENT: SIMULATOR: ____ PLANT SITE: ____ Classroom: X

TESTING METHOD: SIMULATE: ____ PERFORM: X

APPROXIMATE COMPLETION TIME IN MINUTES: 15 MINUTES

REFERENCE(S): RWP 2016-1002, P-34A survey map,

EXAMINEE'S NAME: ____ Logon ID: ____

EVALUATOR'S NAME: ____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY: ____ UNSATISFACTORY: ____

PERFORMANCE CHECKLIST COMMENTS:

____

____

____

____ Start Time ____ Stop Time ____ Total Time

SIGNED ____ DATE: ____

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

ADMINISTRATIVE JOB PERFORMANCE MEASURE

THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:

The examiner shall ensure that the examinee has been briefed on the JPM Examination Briefing Sheet EN-TQ-114 Attachment 9.5 or NUREG 1021 Appendix E.

INITIAL PLANT CONDITIONS

- Decay Heat Removal Pump P-34A has indications of a leak on the pump inboard seal.
- The SM/CRS has directed you to quantify the leakage from the P-34A pump inboard seal.
- Your total dose for the year is currently 1950 mrem.
- You are a qualified CAT 3 Advanced Rad Worker.

TASK STANDARD:

Using the above information, applicant determined:

- Remaining available dose is 50 mR
- MAXIMUM stay time at the P-34A pump inboard seal area is 26.1 to 26.0 minutes.
- Required protective clothing requirements are single set of anti-Cs.

TASK PERFORMANCE AIDS: RWP 2016-1002, P-34A survey map .

SIMULATOR SETUP: NA

A1JPM-RO-ADMIN-RWP3 (A4)

ADMINISTRATIVE JOB PERFORMANCE MEASURE

INITIATING CUE:

Use the attached RWP, 2016-1002 Task 1.

Using the above information, determine your MAXIMUM stay time at the P-34A pump inboard seal area and the required protective clothing for entry.

(C)	PERFORMANCE STEP	PERFORMANCE STANDARD	SAT	UNSAT	N/A
	1. Reviews P-34A Pump survey map to determine dose rates in the vicinity of the inboard pump seal.	Examinee determined dose rate of 115 mR/hr at the inboard pump seal.	_____	_____	_____
(C)	2. Determines stay time based on the given dose in the pump inboard seal area not to exceed the RWP limits. $\frac{50 \text{ mR}}{115 \text{ mR/hr}} \times \frac{60 \text{ min}}{1 \text{ hr}} = 26.1$ minutes	Examinee determined stay time based on RWP limits of 50 mrem would allow him to stay at the pump inboard seal area for 26.1 minutes (-0.1 minutes).	_____	_____	_____
(C)	3. Reviews P-34A Pump survey map for contamination smear data to determine the protective clothing (PC) requirements for this task.	Examinee identified the contamination levels are > 1000 dpm/100 cm^2 but less than 100,000 dpm/100 cm^2; therefore, a single set of Anti-Cs is required to enter into the P-34A pump room.	_____	_____	_____

END

ANSWER KEY

JPM INITIAL TASK CONDITIONS:

- Decay Heat Removal Pump P-34A has indications of a leak on the pump inboard seal.
- The SM/CRS has directed you to quantify the leakage from the P-34A seal.
- Your total dose for the year is currently 1950 mrem.
- You are a qualified CAT 3 Advanced Rad Worker.

INITIATING CUE:

Refer to the attached RWP, 20161002 Task 1 and the P-34A pump room survey map.

Using the above information, determine:

- Your remaining available dose for the year based on ANO administrative limits.

  50 mR

- Your "MAXIMUM" stay time at the P-34A pump inboard seal area.

$$\frac{50\text{ mR}}{\mathbf{115\text{ mR/hr}}} \times \frac{60\text{ min}}{1\text{ hr}} = \underline{\mathbf{26.1\text{ minutes}}\ \ (-0.1\text{ minutes})}\ \text{(C)}$$

- Your "Protective Clothing" requirements:

  Single set of Anti-Cs (C)

ADMINISTRATIVE JOB PERFORMANCE MEASURE

EXAMINEE'S COPY

JPM INITIAL TASK CONDITIONS:

- Decay heat Removal Pump P-34A has indications of a leak on the pump inboard seal.
- The SS/CRS has directed you to quantify the leakage from the P-34A seal.
- Your total dose for the year is currently 1950 mrem.
- You are a qualified CAT 3 Advanced Rad Worker.

INITIATING CUE:

Refer to the attached RWP, 20161002 Task 1 and the P-34A pump room survey map.

Using the above information, determine:

- Your remaining available dose for the year based on ANO administrative limits.

____

- Your "MAXIMUM" stay time at the P-34A pump inboard seal area.

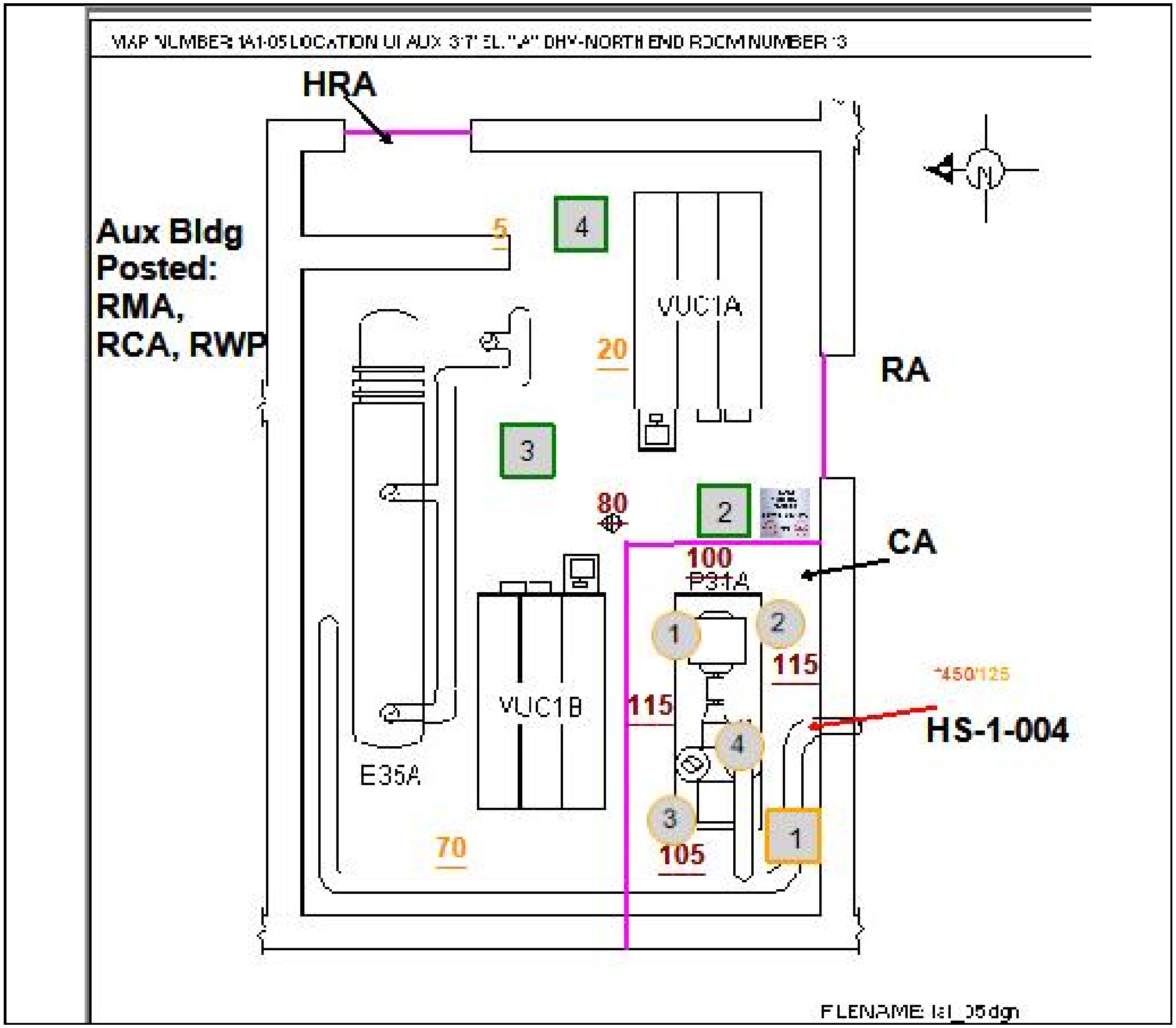
____

- Your "Protective Clothing" requirements:

____

____

____



Smear Data (DPM/100cm2)

1	20000	DPM
2	25000	DPM
3	30000	DPM
4	35000	DPM

LAS Data (ccpm/LAS)

1	6000	ccpm/LAS
2	<100	ccpm/LAS
3	<100	ccpm/LAS
4	<100	ccpm/LAS

B/G to Alpha Ratio

Alpha Data (DPM/100cm2)

DPM

Details

Unit:	**1**
Building:	**RAB**
Elevation:	**317**
Room:	**13**
RxPwr:	**100**
Template:	**1a1-05_jpg**
Frequency:	**10CFR50.75G Decomm**
Survey Date:	**08/22/2016 15:58**
Status:	**In-Progress**
Rwp:	**20161001**
Hydro Inj Rate:	**NA**
Surveyed By:	Harrell, John
Badge:	20970
Reviewed By:	
Notes:	

Instruments Used

Instrument:	LM-177	CHP-CR-148
Cal Due Date:	**7/31/2016**	
SrcChk Date:	**6/29/2016**	
DC & Bkg:	**NA**	**NA**
MDA:	**NA**	
Instrument:	9-3	CHP-DR-331
Cal Due Date:	**12/31/2016**	
SrcChk Date:	**6/29/2016**	
DC & Bkg:	**NA**	**NA**
MDA:	**NA**	

All Radiation values are in mrem/hr unless otherwise noted
Smear contamination values in DPM /100cm2 unless otherwise noted
☐ Smear < 1000 DPM H .S. - denotes Hot Spot
*12/13 denotes gamma contact / 30cm
*12/13 B denotes beta contact / 30 cm
12.5 denotes gamma general area, T denotes RADS telemetry
*75 B denotes beta contact doserate
*12 denotes gamma contact doserate
(11) denotes smear locations
[12] denotes large area wipe locations.

Entergy
Arkansas Nuclear One

RADIOLOGICAL WORK PERMIT

******* NOT FOR FIELD WORK *******

Consult Posted Copy for Official Radiological Work Permit Information

RWP Title: OPERATIONS ACTIVITIES UNIT-1			**RWP No.:** 20161002 Rev. 00	
Comments:			*20161002*	
RWP Type: SPECIFIC		**RWP Status:** ACTIVE	**Begin Date:** 1/1/2016	**Close On Date:** 12/31/2016
Prepared By: NICKELS, THOMAS W		**Job Supervisor:** Jeff Horton		
Estimated Dose: 528 mrem	**Estimated Hours:** 14,400.00	**Actual Dose:** 293 mrem	**Actual Hours:** 9,041.99	

Locations

Buildings	Elevations	Rooms
LOW LEVEL RADWASTE BUILDING	354	NON-LOCKED HIGH RADIATION AREA
OLD RADWASTE BUILDING	354	NON-LOCKED HIGH RADIATION AREA
OUTSIDE CONTROLLED ACCESS	ALL	OUTSIDE CONTROLLED ACCESS
UNIT 1 AUXILIARY BUILDING	ALL	NON-LOCKED HIGH RADIATION AREA

Radiological Conditions

Description	Value	Unit
Smear data is in dpm/100 cm2 unless otherwise noted.	<1K - 40K	DPM/100CM2
General area gamma dose rates are in mrem/hour unless otherwise noted.	0.1 - 200	MILLIREM/HOUR

Tasks

Task	Description	Status
1	OPERATIONS ACTIVITIES UNIT-1	Active
2	OPERATIONS TRAINEE ACTIVITIES UNIT-1	Active

Requirements

Requirement Groups	Requirement Descriptions
N/A	

Additional Instructions

Instruction 1:

Instruction 2:

Instruction 3:

Approvals

Approver Title	Name	Date
ALARA REVIEW	STELL, RANDALL E	12/22/2015
RWP PREPARER	STELL, RANDALL E	12/22/2015
RP SUPERVISOR	LYNCH, BERT A	12/22/2015

Attachments

N/A

Entergy
Arkansas Nuclear One

RADIOLOGICAL WORK PERMIT

******* NOT FOR FIELD WORK *******

Consult Posted Copy for Official Radiological Work Permit Information

Task Number: 1		**RWP No.:** 20161002 **Rev.:** 00	
Task Description: OPERATIONS ACTIVITIES UNIT-1		**Task Status:** Active	
Estimate Dose: 420.00		**Estimate Hours:** 12,000.00	
Hi-Rad: Yes	**Hot Particle:** No	**Locked Hi-Rad:** No	**Hi-Contamination:** No
Alarm Settings			
Dose Alarm (mrem)	**50.00**	**Dose Rate** (mrem/hr)	**150.00**

Requirements

Requirement Groups	Requirement Descriptions
Contamination Control	All materials are required to be surveyed in a small articles monitor or hand frisked by RP (with RP Supervisor approval) PRIOR TO unconditional release from a Radiologically Controlled Area.
	IF the RCA is a satellite RCA and a "Contamination Area" is entered, THEN the radworker should perform a whole body frisk and proceed to the nearest whole body contamination monitor (PCM-1B or equivalent).
	IF the RCA is a satellite RCA with no whole body contamination monitor available, THEN the radworker should: a) perform a hand and foot frisk. b) IF the frisk indicates contamination is present, THEN contact RP. c) IF the frisk DOES NOT indicate the presence of contamination, THEN proceed to the nearest whole body contamination monitor and gamma sensitive monitor.
	Notify RP prior to exposing a contaminated surface or opening a contaminated system.
	Obey the monitoring instructions posted at the RCA exit point
	Upon exit of an RCA, whole body monitoring is required utilizing a whole body contamination monitor (PCM-1B or equivalent). A whole body gamma monitor must also be cleared (PM-7 or equivalent).
	Upon exiting areas posted as "Contamination Area", perform a hand and foot frisk at the designated frisker location.
	Use RP approved mats or pads when kneeling, sitting or laying in contaminated areas.
	Use face shield for activities that have increased risk of facial contamination. These activities include working with contaminated components overhead, or having a body position that presents the potential for facial contamination.
	With RP approval, reaching across a contamination boundary is permitted using surgeon's gloves OR cotton liners with rubber gloves. When reaching into the area of higher contamination, gloves must be removed when hands are returned to the lower level side of the boundary.
Dosimetry Requirements	FOR WORK IN HIGH RADIATION AREAS - If your work conditions are in OR will cause hearing impairment (such as work in a high noise area, use of a communications headset, etc.) THEN the use of an EAD amplifying device (PAM) is required.
	If an EAD dose alarm occurs: 1) Secure Work. 2) Immediately leave the RCA. 3) Notify RP.
	If an EAD dose rate alarm occurs: 1) Secure Work. 2) Back out of the immediate area until the alarm clears. 3) Notify others in your work crew. 4) Immediately notify RP for further instructions.
	Periodically check your EAD. This check should be performed more frequently in areas where your ability to hear is diminished.
	Periodically check your EAD. This check should be performed more frequently in areas where your ability to hear is diminished.
	Whole body DLR and EAD required for entry.

Additional Instructions

RADIOLOGICAL WORK PERMIT

******* NOT FOR FIELD WORK *******

Consult Posted Copy for Official Radiological Work Permit Information

Instruction 1:

Task Number: 1	**RWP No.:** 20161002 **Rev.:** 00

Requirements

Requirement Groups	Requirement Descriptions
Engineering Controls	When venting or draining, monitor the rate of system drain to ensure the rate of drain does NOT exceed the capacity of the floor drain.
Exposure Reduction	Use Low Dose Waiting Areas whenever possible to minimize exposure.
Protective Requirements	All joints between Anti-C gloves /sleeves and Anti-C ankles/ booties must be taped.
	Entry into Contamination Areas require single Anti-Cs.
	Entry into High Contamination Areas require double Anti-Cs .
RP Coverage	A "Cat 3 Advanced Radworker" may enter posted High Radiation Areas using a gamma sensitive RP instrument to monitor dose rates. (NOTE: An EAD is NOT an appropriate survey instrument. LHRA/ VHRA entry requires continuous RP coverage.).
	Contact RP Supervisor or RP tech prior to entry to verify adequate RP coverage and contamination controls for your work activity. RP is not required to be notified for entries to the Auxiliary Building to perform routine activities that do not involve High Radiation Areas, Contamination Areas, overhead entry or system breaches.
	Entry into High Radiation Areas requires a radiological brief from RP, AND an electronic alarming dosimeter (EAD) to meet Tech Spec monitoring requirements.
	Initial / Intermittent RP coverage is required for entry into High Radiation Areas.
	Notify RP when performing operations activities which could change plant radiological conditions. For example venting/draining radioactive systems, performing degas or decay heat/shutdown cooling operations, or other non routine system functions.
Radiological Conditions	Contact Radwaste Personnel for radiological conditions in the Radwaste Buildings.
	Radiological conditions should be reviewed to ensure awareness of conditions in your work area. This information can be obtained from either a Status Board or RP personnel.
Respiratory Protection	Based on historical and current data, the airborne radioactivity is less than 30 percent of a DAC. Respiratory protection is not required unless otherwise directed by RP Supervision.
Special Radiological Requirements	Critical Step - Prior to movement of irradiated fuel or other irradiated materials, notify RP Shift Tech or RP Supervisor that movement of fuel / irradiated components is going to occur. DO NOT move fuel or irradiated components near cask loading gate or tilt pit gate when the adjacent pit is drained as this can result in high general area dose rates.
	The prerequisite for a secondary resin transfer include 1) Secure the fill head such that changes in pressure will not cause a spill. 2) Conduct a walkdown (pre-transfer) to ensure that hose connections and leak integrity is satisfactory. 3) Construct a berm sufficient to contain the material being transferred.
	Additional Requirement: -Critical Step - Ensure ARM is installed on the bridge and is operation prior to performing any fuel movements. The ARM alarm set point is determined by RP supervision.
Stop Work Criteria	Critical Step - Indications either from local samples or remote indication (CAM) of airborne radioactivity in quantities in excess of 30 percent of a DAC.
	Critical Step - Loss of control of radioactive material such that loose surface contamination outside of any protective measures is greater than area postings
	Critical Step - Radiation dose rates in the immediate area are greater than the EAD dose rate alarm set point.
	CRitical Step - Work involving alpha contamination greater than or equal to 100 dpm/100cm2 CAN NOT be worked on a General RWP.

Entergy
Arkansas Nuclear One

RADIOLOGICAL WORK PERMIT

******* NOT FOR FIELD WORK *******

Consult Posted Copy for Official Radiological Work Permit Information

Task Number: 1	**RWP No.:** 20161002 **Rev.:** 00

Additional Instructions
Instruction 1:
Instruction 2:
Instruction 3:
Instruction 4:
Instruction 5:

Attachments
N/A

Entergy
Arkansas Nuclear One

RADIOLOGICAL WORK PERMIT

******* NOT FOR FIELD WORK *******

Consult Posted Copy for Official Radiological Work Permit Information

Task Number: 2		**RWP No.:** 20161002 **Rev.:** 00	
Task Description: OPERATIONS TRAINEE ACTIVITIES UNIT-1		**Task Status:** Active	
Estimate Dose: 108.00		**Estimate Hours:** 2,400.00	
Hi-Rad: Yes	**Hot Particle:** No	**Locked Hi-Rad:** No	**Hi-Contamination:** No
Alarm Settings			
Dose Alarm (mrem)	**10.00**	**Dose Rate** (mrem/hr)	**100.00**

Requirement Groups	**Requirement Descriptions**
Contamination Control	All materials are required to be surveyed in a small articles monitor or hand frisked by RP (with RP Supervisor approval) PRIOR TO unconditional release from a Radiologically Controlled Area.
	IF the RCA is a satellite RCA and a "Contamination Area" is entered, THEN the radworker should perform a whole body frisk and proceed to the nearest whole body contamination monitor (PCM-1B or equivalent).
	IF the RCA is a satellite RCA with no whole body contamination monitor available, THEN the radworker should: a) perform a hand and foot frisk. b) IF the frisk indicates contamination is present, THEN contact RP. c) IF the frisk DOES NOT indicate the presence of contamination, THEN proceed to the nearest whole body contamination monitor and gamma sensitive monitor.
	Notify RP prior to exposing a contaminated surface or opening a contaminated system.
	Obey the monitoring instructions posted at the RCA exit point
	Upon exit of an RCA, whole body monitoring is required utilizing a whole body contamination monitor (PCM-1B or equivalent). A whole body gamma monitor must also be cleared (PM-7 or equivalent).
	Upon exiting areas posted as "Contamination Area", perform a hand and foot frisk at the designated frisker location.
	Use RP approved mats or pads when kneeling, sitting or laying in contaminated areas.
	Use face shield for activities that have increased risk of facial contamination. These activities include working with contaminated components overhead, or having a body position that presents the potential for facial contamination.
	With RP approval, reaching across a contamination boundary is permitted using surgeon's gloves OR cotton liners with rubber gloves. When reaching into the area of higher contamination, gloves must be removed when hands are returned to the lower level side of the boundary.
Dosimetry Requirements	FOR WORK IN HIGH RADIATION AREAS - If your work conditions are in OR will cause hearing impairment (such as work in a high noise area, use of a communications headset, etc.) THEN the use of an EAD amplifying device (PAM) is required.
	If an EAD dose alarm occurs: 1) Secure Work. 2) Immediately leave the RCA. 3) Notify RP.
	If an EAD dose rate alarm occurs: 1) Secure Work. 2) Back out of the immediate area until the alarm clears. 3) Notify others in your work crew. 4) Immediately notify RP for further instructions.
	Periodically check your EAD. This check should be performed more frequently in areas where your ability to hear is diminished.
	Periodically check your EAD. This check should be performed more frequently in areas where your ability to hear is diminished.
	Whole body DLR and EAD required for entry.

Additional Instructions

Instruction 1:

RADIOLOGICAL WORK PERMIT

******* NOT FOR FIELD WORK *******

Consult Posted Copy for Official Radiological Work Permit Information

Task Number: 2	**RWP No.:** 20161002 **Rev.:** 00

Requirements

Requirement Groups	Requirement Descriptions
Engineering Controls	When venting or draining, monitor the rate of system drain to ensure the rate of drain does NOT exceed the capacity of the floor drain.
Exposure Reduction	Use Low Dose Waiting Areas whenever possible to minimize exposure.
Protective Requirements	All joints between Anti-C gloves /sleeves and Anti-C ankles/ booties must be taped.
	Entry into Contamination Areas require single Anti-Cs.
	Entry into High Contamination Areas require double Anti-Cs .
RP Coverage	A "Cat 3 Advanced Radworker" may enter posted High Radiation Areas using a gamma sensitive RP instrument to monitor dose rates. (NOTE: An EAD is NOT an appropriate survey instrument. LHRA/ VHRA entry requires continuous RP coverage.).
	Contact RP Supervisor or RP tech prior to entry to verify adequate RP coverage and contamination controls for your work activity. RP is not required to be notified for entries to the Auxiliary Building to perform routine activities that do not involve High Radiation Areas, Contamination Areas, overhead entry or system breaches.
	Entry into High Radiation Areas requires a radiological brief from RP, AND an electronic alarming dosimeter (EAD) to meet Tech Spec monitoring requirements.
	Initial / Intermittent RP coverage is required for entry into High Radiation Areas.
	Notify RP when performing operations activities which could change plant radiological conditions. For example venting/draining radioactive systems, performing degas or decay heat/shutdown cooling operations, or other non routine system functions.
Radiological Conditions	Contact Radwaste Personnel for radiological conditions in the Radwaste Buildings.
	Radiological conditions should be reviewed to ensure awareness of conditions in your work area. This information can be obtained from either a Status Board or RP personnel.
Respiratory Protection	Based on historical and current data, the airborne radioactivity is less than 30 percent of a DAC. Respiratory protection is not required unless otherwise directed by RP Supervision.
Special Radiological Requirements	Critical Step - Prior to movement of irradiated fuel or other irradiated materials, notify RP Shift Tech or RP Supervisor that movement of fuel / irradiated components is going to occur. DO NOT move fuel or irradiated components near cask loading gate or tilt pit gate when the adjacent pit is drained as this can result in high general area dose rates.
	The prerequisite for a secondary resin transfer include 1) Secure the fill head such that changes in pressure will not cause a spill. 2) Conduct a walkdown (pre-transfer) to ensure that hose connections and leak integrity is satisfactory. 3) Construct a berm sufficient to contain the material being transferred.
	Additional Requirement: -Critical Step - Ensure ARM is installed on the bridge and is operation prior to performing any fuel movements. The ARM alarm set point is determined by RP supervision.
Stop Work Criteria	Critical Step - Indications either from local samples or remote indication (CAM) of airborne radioactivity in quantities in excess of 30 percent of a DAC.
	Critical Step - Loss of control of radioactive material such that loose surface contamination outside of any protective measures is greater than area postings
	Critical Step - Radiation dose rates in the immediate area are greater than the EAD dose rate alarm set point.
	CRitical Step - Work involving alpha contamination greater than or equal to 100 dpm/100cm2 CAN NOT be worked on a General RWP.

RADIOLOGICAL WORK PERMIT

******* NOT FOR FIELD WORK *******

Consult Posted Copy for Official Radiological Work Permit Information

Task Number: 2	**RWP No.:** 20161002 **Rev.:** 00

Additional Instructions
Instruction 1:
Instruction 2:
Instruction 3:
Instruction 4:
Instruction 5:

Attachments
N/A

Unit 1 2016 NRC Exam

ADMIN JPM

A5

UNIT: 1 REV # 1 DATE: ______________________________

TUOI NUMBER: A1JPM-NRC-WHHR (A1/A5)

SYSTEM/DUTY AREA: ADMINISTRATIVE TOPIC – CONDUCT OF OPERATIONS

TASK: PERFORM WORKING HOUR HISTORY REVIEW AND SELECT ELIGIBLE OPERATORS TO FILL VACANCY DUE TO ILLNESS OF THE ONCOMING ATC WATCH

JTA#: ANO-RO-ADMIN-NORM-195/ANO-SRO-ADMIN-NORM-191

KA VALUE RO: 2.9 SRO: 3.9 KA REFERENCE: 2.1.5

APPROVED FOR ADMINISTRATION TO: RO: X SRO: X

TASK LOCATION: INSIDE CR:______ OUTSIDE CR:_______ BOTH: X

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE:__________ SIMULATOR:____________ CLASSROOM: PERFORM

POSITION EVALUATED: RO:__________ SRO:___________

ACTUAL TESTING ENVIRONMENT: SIMULATOR:_________ PLANT SITE:______ CLASSROOM:_____

TESTING METHOD: SIMULATE:_________ PERFORM:___________

APPROXIMATE COMPLETION TIME IN MINUTES: 15 MINUTES

REFERENCE(S): EN-OM-123

EXAMINEE'S NAME:________________________________ Logon ID: ___________________

EVALUATOR'S NAME:____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY:________________ UNSATISFACTORY:_________________

PERFORMANCE CHECKLIST COMMENTS:

____

____

____

____________ Start Time ____________ Stop Time ____________ Total Time

SIGNED ________________________________ DATE: _______________________

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:

The examiner should verify that the examinee has been briefed on the JPM Examination Briefing Sheet EN-TQ-114 Attachment 9.5 or NUREG-1021 App. E.

JPM INITIAL TASK CONDITIONS: The plant is at 100% power operations. The scheduled day-shift oncoming ATC operator has called in and stated he will not be able to come in to take the ATC watch due to an illness. The 54 hour rolling average working limits in the last six weeks are met. PQ&S Computer program is not available.

A, C, D, and E

TASK STANDARD: The examinee has correctly selected operators ~~A, C and E~~ that are available to come in to fill the 12 hour dayshift ATC watch vacancy in accordance with the work hour limits for covered individuals and correctly stated why operator~~s~~ B ~~and D~~ cannot come in.

TASK PERFORMANCE AIDS: Working Hour History for the last 14 days for Operators A,B,C,D, and E

INITIATING CUE:

The Shift Manager has directed you to review the given work history of five eligible qualified operators and determine which one(s) would be available to fill the ATC vacancy for the upcoming 12 hour day-shift in accordance with the Fatigue Management Program. Explain why any operator may be ineligible to fill the vacancy if any cannot.

CRITICAL ELEMENTS (C):_________

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UNSAT	N/A
NOTE: Provide examinee with a copy of the work history or the five eligible candidates.					
(C)	1. Review working hour history for Operator 'A'.	Determines that Operator 'A' is eligible to fill the oncoming ATC watch vacancy without exceeding any working hour limits.	_____	_____	_____
(C)	2. Review working hour history for Operator 'B'.	Determines that Operator 'B' is NOT eligible to fill the oncoming ATC watch vacancy because the operator will exceed the "Maximum of 72 work hours in any 7 day period" working hour limit. Would also work 24 hrs straight.	_____	_____	_____
(C)	3. Review working hour history for Operator 'C'.	Determines that Operator 'C' is eligible to fill the oncoming ATC watch vacancy without exceeding any working hour limits. .	_____	_____	_____
(C)	4. Review working hour history for Operator 'D'.	Determines that Operator 'D' is ~~NOT~~ eligible to fill the oncoming ATC watch vacancy ~~because the operator will not have had a "Minimum 34 hour break in any 9 day period" working hour limit.~~	_____	_____	_____
(C)	5. Review working hour history for Operator 'E'.	Determines that Operator 'E' is eligible to fill the oncoming ATC watch vacancy without exceeding any working hour limits.	_____	_____	_____
NOTE: Inform examinee that JPM is complete.					

END

EXAMINER ANSWER KEY

Operator	Eligible/Not Eligible	Reason (if not eligible)
Operator A	Eligible (C)	
Operator B	Not Eligible (C)	Will Exceed 72 hours in a 7 day period. (C) Would also work 24 hrs straight.
Operator C	Eligible (C)	
Operator D	~~Not~~ Eligible (C)	~~No 34 hour break in a 9 day period. (C)~~
Operator E	Eligible (C)	

EXAMINEE'S COPY

JPM INITIAL TASK CONDITIONS:

- The plant is at 100% power operations.
- The scheduled day-shift oncoming ATC operator has called in and stated he will not be able to come in to take the ATC watch due to an illness.
- The 54 hour rolling average working limits in the last six weeks are met.
- PQ&S computer program is not available.

INITIATING CUE:

The Shift Manager has directed you to review the given work history of five eligible qualified operators and determine which one(s) would be available to fill the ATC vacancy for the upcoming 12 hour day-shift in accordance with the Fatigue Management Program.

Explain why any operator may be ineligible to fill the vacancy if any cannot.

EXAMINEE'S COPY

Operator	Eligible/Not Eligible	Reason (if not eligible)
Operator A		
Operator B		
Operator C		
Operator D		
Operator E		

Operator A		14 Day work hour history for a covered worker 'A'. In the following Table Day 1 is Today, Day 2 is Yesterday, etc.											
DAY	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Shift Schedule	D	OFF	OFF	OFF	N	N	N	OFF	OFF	D	D	D	D	
Hours Worked	12				12	12	12			12	12	12	12	
														TODAY

For Shift Schedule 'D' is for day-shift schedule, 'N' is for night-hift schedule
Reference EN-OM-123

Operator B		14 Day work hour history for a covered worker 'B'. In the following Table Day 1 is Today, Day 2 is Yesterday, etc.											
DAY	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Shift Schedule	OFF	D	D	OFF	OFF	OFF	OFF	N	N	N	N	N	N	
Hours Worked		12	12					12	12	12	12	12	12	
														TODAY

For Shift Schedule 'D' is for day-shift schedule, 'N' is for night-hift schedule
Reference EN-OM-123

Operator C		14 Day work hour history for a covered worker 'C'. In the following Table Day 1 is Today, Day 2 is Yesterday, etc.											
DAY	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Shift Schedule	OFF	OFF	D	D	D	D	Off	OFF	N	N	N	N	Off	
Hours Worked			12	12	12	12			12	12	12	12		
														TODAY

For Shift Schedule 'D' is for day-shift schedule, 'N' is for night-hift schedule
Reference EN-OM-123

Operator D		14 Day work hour history for a covered worker 'D'. In the following Table Day 1 is Today, Day 2 is Yesterday, etc.											
DAY	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Shift Schedule	N	OFF	OFF	OFF	D	D	D	OFF	D	D	D	D	D	
Hours Worked	12				12	12	12		12	12	12	12	12	
														TODAY

For Shift Schedule 'D' is for day-shift schedule, 'N' is for night-hift schedule
Reference EN-OM-123

Operator E		14 Day work hour history for a covered worker 'E'. In the following Table Day 1 is Today, Day 2 is Yesterday, etc.											
DAY	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Shift Schedule	D	D	OFF	OFF	OFF	N	N	N	OFF	OFF	D	D	D	
Hours Worked	12	12				12	12	12			12	12	12	
														TODAY

For Shift Schedule 'D' is for day-shift schedule, 'N' is for night-hift schedule
Reference EN-OM-123

From:	Gaddy, Vincent
To:	Farina, Thomas
Subject:	RE: Markups to ANO1 Scenario 1 and Admin JPM A1/A5
Date:	Tuesday, August 30, 2016 9:49:30 AM

I agree!

From: Farina, Thomas
Sent: Monday, August 29, 2016 3:37 PM
To: Gaddy, Vincent <------------------->
Subject: Markups to ANO1 Scenario 1 and Admin JPM A1/A5

Vince,
During administration of the ANO1 operating test last week, two changes to the final approved exam submitted by ANO were identified as requiring revision.

First, Scenario 1 requires a change to Critical Task 2 due to an unreasonably narrow window between failure of ES Channels 1 and 2 to actuate at 1590 psig, and RCS pressure dropping below the CT failure criteria of 1550 psig. This window afforded the applicants only a few seconds to recognize and respond to the malfunction. The exam team in coordination with the licensee staff revalidated a more reasonable Critical Task 2, listed below. Attached is the intended markup to the D-1.

Original Scenario 1 CT-2:
"CT-2 Initiate HPI on a loss of Subcooling margin – Complete the manual actuation of ESAS Channels 1 or 2 prior to RCS press < 1550 psig."

Revised Scenario 1 CT-2:
"CT-2 Initiate HPI on a loss of Subcooling margin – Complete the manual actuation of ESAS Channels 1 or 2 prior to subcooling decreasing to zero."

Second, administrative JPM A1/A5 requires a revision to its task standard, due to identification during administration that one of the operators who was intended to be ineligible to stand a 12 hour watch, was in fact eligible (operator D). Therefore, of the five operators listed, only operator B is ineligible. Attached is an email from ANO staff confirming the accuracy of the revised task standard.

Original JPM A1/A5 Task Standard:
"The examinee has correctly selected operators A, C and E that are available to come in to fill the 12 hour dayshift ATC watch vacancy in accordance with the work hour limits for covered individuals and correctly stated why operators B and D cannot come in."

Revised JPM A1/A5 Task Standard:
"The examinee has correctly selected operators A, C, D, and E that are available to come in to fill the 12 hour dayshift ATC watch vacancy in accordance with the work hour limits for covered individuals and correctly stated why operator B cannot come in."

If you approve of these revisions to the as-given exam, please reply in the affirmative. The final exam uploaded into ADAMS will be marked up to reflect the revised materials, and

your response email will be attached as documentation of your approval.

Thanks,
TJ

Thomas Farina
Sr. Operations Engineer
USNRC Region IV
Division of Reactor Safety, Operations Branch

Coble, Billy Noel (exam author)

From: Coble, Billy Noel
Sent: Wednesday, August 24, 2016 8:25 AM
To: MARTIN, RANDAL K
Subject: Unit 1 NRC Exam Admin JPM A1 and A5

Based on a review of the as administered JPM A1 and A5 for the Unit 1 NRC exam, Operator D would be eligible and available to call out for work to fill the ATC vacancy for the upcoming 12 hour shift. The work history for Operator D was verified by the PQ&S site coordinator and he concurred that operator D could fill the ATC vacancy.

The Examiner Key provided was in error for Operator D in that Operator D had a 36 hour break between Day 8 and Day 6 of the working hour history report. Operator D concluded the shift at 1800 on Day 8. Operator D then had Day 7 off and reported to work on Day 6 at 0600. This is a total of 36 hours off. Therefore, Operator D did meet the "Minimum 34 – hour break in any 9 day period" working hour limit.

Therefore the correct answer: Operator D is "Eligible" to fill the oncoming ATC vacancy for the 12 hour shift without exceeding any working hour limits and no reason should be listed on the KEY.

Unit 1 2016 NRC Exam

ADMIN JPM

A6

UNIT: 1 REV #: 2 DATE: ____________

SYSTEM/DUTY AREA: Conduct of Operations

TASK: Perform Spent Fuel Pool Makeup Calculation.

JTA#: ANO1-RO-SFC-NORM-17

KA VALUE RO: 4.6 SRO: 4.6 KA REFERENCE: 2.1.20

APPROVED FOR ADMINISTRATION TO: RO: X SRO: x

TASK LOCATION: INSIDE CR: ____ OUTSIDE CR: ____ BOTH: X

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE: ____ SIMULATOR: ____ Classroom: Perform

POSITION EVALUATED: RO: ____ SRO: ____

ACTUAL TESTING ENVIRONMENT: SIMULATOR: ____ PLANT SITE: ____ Classroom: ____

TESTING METHOD: SIMULATE: ____ PERFORM: X

APPROXIMATE COMPLETION TIME IN MINUTES: 20 Minutes

REFERENCE(S): 1104.003, Att. C2

EXAMINEE'S NAME: ____________ Logon ID: ____________

EVALUATOR'S NAME: ____________

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY: ____ UNSATISFACTORY: ____

PERFORMANCE CHECKLIST COMMENTS:

____

____

Start Time ____ Stop Time ____ Total Time ____

SIGNED: ____________ DATE: ____________

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:

The examiner shall ensure that the examinee has been briefed on the JPM Examination Briefing Sheet EN-TQ-114 Attachment 9.5 or NUREG 1021 Appendix E.

JPM INITIAL TASK CONDITIONS:

Given the following Plant conditions:

- Plant is in refueling Outage 1R26
- SF Pool level is -0.4 ft.
- SF Pool Boron concentration 2300 ppm.
- BAAT Boron concentration 12,250 ppm.
- Tilt Pit and Cask Pit gates are removed.
- Fuel Transfer Tube Isolation SF-45 is Closed

TASK STANDARD:

Determined initial SF Pool volume is 362,843 gallons from Table 2.

Determined feed volume to be 3684 ± 2 gallons.

Determined final SF Pool volume to be 366,527 ± 5 gallons.

Determined final SF Pool level is 0.0 to -0.1 ft.

TASK PERFORMANCE AIDS:

1104.003, Attachment C2

SIMULATOR SETUP:

NA

EXAMINER'S NOTES:

INITIATING CUE:

CRS directs you to perform 1104.003, Chemical Addition, Attachment C2, for makeup to SFP to raise Boron concentration to 2400 ppm. Determine amount of Boric Acid volume needed. Determine final SFP Volume and Level.

PERFORMANCE CHECKLIST			STANDARDS	(Circle One)
(C)	1.	Determine initial SF Pool volume from Table 2.	Determined volume is 362,843 gallons from Table 2.	SAT UNSAT N/A
	2.	Record data.	Recorded data.	SAT UNSAT N/A
(C)	3.	Determine feed volume to be added to SF Pool.	Determined feed volume to be 3684 ± 2 gallons.	SAT UNSAT N/A
(C)	4.	Determine final SF Pool volume.	Determined final SF Pool volume to be 366,527 ± 5 gallons.	SAT UNSAT N/A
(C)	5	Determine final SF Pool level	Determined final SF Pool level is from 0.0 to -0.1 ft.	SAT UNSAT N/A
END				

ANSWER KEY

JPM INITIAL TASK CONDITIONS:

Given the following Plant conditions:

- Plant is in Refueling Outage 1R26.
- SF Pool level is -0.4 ft.
- SF Pool Boron concentration 2300 ppm.
- BAAT Boron concentration 12,250 ppm.
- Tilt Pit and Cask Pit gates are removed.
- Fuel Transfer Tube Isolation SF-45 is Closed

INITIATING CUE:

CRS directs you to perform 1104.003, Chemical Addition, Attachment C2, for makeup to SFP to raise Boron concentration to 2400 ppm.
Determine amount of Boric Acid volume needed.
Determine final SF Pool volume.
Determine final SF Pool level.

Document the results of the review below:

(C) Determined initial SF Pool volume is currently 362,843 gallons from Table 2.

(C) Determined feed volume to be 3684 ± 2 gallons.

(C) Determined final SF Pool volume to be 366,527 ± 5 gallons.

(C) Determined final SF Pool level is from 0.0 to -0.1 ft.

Final Level interpolation:

$$\frac{(366{,}692 - 365730)}{(366{,}692 - 366527)} = \frac{-0.1}{X}$$

$$X = \frac{-0.1\ (165)}{962} = -0.017 \text{ feet}$$

Final Level = - 0.017

EXAMINEEE'S COPY

JPM INITIAL TASK CONDITIONS:

Given the following Plant conditions:

- Plant is in Refueling Outage 1R26.
- SF Pool level is -0.4 ft.
- SF Pool Boron concentration 2300 ppm.
- BAAT Boron concentration 12,250 ppm.
- Tilt Pit and Cask Pit gates are removed.
- Fuel Transfer Tube Isolation SF-45 is Closed

INITIATING CUE:

CRS directs you to perform 1104.003, Chemical Addition, Attachment C2, for makeup to SF Pool to raise Boron concentration to 2400 ppm.
Determine amount of Boric Acid volume needed.
Determine final SF Pool volume.
Determine final SF Pool level.

<u>Document the results of the review below:</u>

____

____

____

____

____

____

____

____

ATTACHMENT C2

SF POOL FEED CALCULATIONS

TABLE 1
Spent Fuel Pool and Systems Volume/Ft Depth

SF Pool (gal/ft)	SF Pool + Cask Pit (gal/ft)	SF Pool + Tilt Pit (gal/ft)	SF Pool + Cask Pit + Tilt Pit (gal/ft)	Refueling Canal (gal/ft)	Incore Tank (gal/ft)
7,570	8,349	8,845	9,624	11,070	1,141

TABLE 2
Spent Fuel Pool and Systems Volume (gallons)

Elev. (ft)	LI-2004	SF Pool	SF Pool + Cask Pit	SF Pool + Tilt Pit (1)	SF Pool + Cask Pit + Tilt Pit (1)	Refueling Canal	Incore Tank
401.5	+1.0 ft	298,120	330,899	343,537	376,316	During refueling, canal level must be maintained between -0.5 and 0.0 on the SFP Level indicator (LI-2004).	
401.4	+0.9 ft	297,363	330,064	342,653	375,354		
401.3	+0.8 ft	296,606	329,229	341,768	374,392		
401.2	+0.7 ft	295,849	328,394	340,884	373,429		
401.1	+0.6 ft	295,092	327,559	339,999	372,467		
401.0	+0.5 ft	294,335	326,725	339,115	371,504		
400.9	+0.4 ft	293,578	325,890	338,230	370,542		
400.8	+0.3 ft	292,821	325,055	337,346	369,580		
400.7	+0.2 ft	292,064	324,220	336,461	368,617		
400.6	+0.1 ft	291,307	323,385	335,577	367,655		
400.5	0.0 ft	290,550	322,550	334,692	366,692	342,800	27,400
400.4	-0.1 ft	289,793	321,715	333,808	365,730	341,693	27,286
400.3	-0.2 ft	289,036	320,880	332,923	364,768	340,586	27,172
400.2	-0.3 ft	288,279	320,045	332,039	363,805	339,479	27,058
400.1	-0.4 ft	287,522	319,210	331,154	362,843	338,372	26,944
400.0	-0.5 ft	286,765	318,376	330,270	361,880	337,265	26,830
399.9	-0.6 ft	286,008	317,541	329,385	360,918	336,158	26,715
399.8	-0.7 ft	285,251	316,706	328,501	359,956	335,051	26,601
399.7	-0.8 ft	284,494	315,871	327,616	358,993	333,944	26,487
399.6	-0.9 ft	283,737	315,036	326,732	358,031	332,837	26,373
399.5	-1.0 ft	282,980	314,201	325,847	357,068	331,730	26,259
399.4	-1.1 ft	282,223	313,366	324,963	356,106	330,623	26,145
399.3	-1.2 ft	281,466	312,531	324,078	355,143	329,516	26,031
399.2	-1.3 ft	280,709	311,696	323,194	354,181	328,409	25,917
399.1	-1.4 ft	279,952	310,861	322,309	353,219	327,302	25,803
399.0	-1.5 ft	279,195	310,026	321,425	352,256	326,195	25,689

(1) Tilt Pit volume from CR-ANO-1-2008-1859-CA2.

CAUTION

Performance of this section requires verification that feed volume will not result in overflowing of the SFP or other attached volumes.

NOTE

- It is necessary to coordinate with Dry Fuel Personnel when making up to the Spent Fuel Pool during Dry Fuel Operations.
- Step 1.0 is solely performed to determine volume of boric acid at a known concentration to achieve a desired final SFP boron concentration, and generally would not be used.

1.0 IF it is desired to calculate the volume of boric acid required to achieve a desired final SFP concentration,
THEN perform the following:

1.1 Determine initial SF Pool volume from TABLE 2. Interpolate if necessary.

1.1.1 IF appropriate,
THEN add Refueling Canal and Incore Tank volume.

V_i = ____________gal = Initial Volume from TABLE 2

1.2 Record the following data:

C_i = __________ppmB = Initial SF Pool concentration

C_f = __________ppmB = Final desired SF Pool concentration

C_{fd} = __________ppmB = Feed concentration to be added to SF Pool

1.3 Determine feed volume to be added to the SF Pool

$$V_{fd} = \frac{(\ V_i\ ) \times (\ C_f - C_i\ )}{(\ C_{fd} - C_f\ )}$$

$$V_{fd} = \frac{(\qquad\qquad) \times (\qquad\qquad - \qquad\qquad)}{(\_\_\_\_\_\_\_\_ - \_\_\_\_\_\_\_\_)}$$

V_{fd} = __________gal.

1.4 Determine final SF Pool volume

Final volume = (V_{fd}) + (V_i)

Final volume = ( ) + ( )

Final Volume = ___________gal.

NOTE

If final SF Pool level is determined to be greater than +1.0 ft or greater than zero when refueling, then the addition will have to be made in separate operations.

1.5 Determine final SF Pool level from TABLE 2, interpolate as necessary.

1.5.1 IF final volume greater than table values
THEN a second addition will have to be done following a level reduction.

1.6 Perform the other sections of this Attachment as required.

2.0 IF needed,
THEN find the volume of feed (V_{fd}) AND use TABLE 1 for SF Pool gal/ft.
IF Refueling Canal or Incore Tank is connected to SF Cooling System
THEN add the appropriate gal/ft to the SF Pool gal/ft.

V_{fd} = [(Final level) - (Initial level)] x (gal/ft)

V_{fd} = [(________ft.) - (__________ft.)] x (________gal/ft)

V_{fd} = ___________gal.

ATTACHMENT C2

SF POOL FEED CALCULATIONS

TABLE 1
Spent Fuel Pool and Systems Volume/Ft Depth

SF Pool (gal/ft)	SF Pool + Cask Pit (gal/ft)	SF Pool + Tilt Pit (gal/ft)	SF Pool + Cask Pit + Tilt Pit (gal/ft)	Refueling Canal (gal/ft)	Incore Tank (gal/ft)
7,570	8,349	8,845	9,624	11,070	1,141

TABLE 2
Spent Fuel Pool and Systems Volume (gallons)

Elev. (ft)	LI-2004	SF Pool	SF Pool + Cask Pit	SF Pool + Tilt Pit (1)	SF Pool + Cask Pit + Tilt Pit (1)	Refueling Canal	Incore Tank
401.5	+1.0 ft	298,120	330,899	343,537	376,316		
401.4	+0.9 ft	297,363	330,064	342,653	375,354		
401.3	+0.8 ft	296,606	329,229	341,768	374,392		
401.2	+0.7 ft	295,849	328,394	340,884	373,429		
401.1	+0.6 ft	295,092	327,559	339,999	372,467		
401.0	+0.5 ft	294,335	326,725	339,115	371,504		
400.9	+0.4 ft	293,578	325,890	338,230	370,542		
400.8	+0.3 ft	292,821	325,055	337,346	369,580		
400.7	+0.2 ft	292,064	324,220	336,461	368,617		
400.6	+0.1 ft	291,307	323,385	335,577	367,655		
400.5	0.0 ft	290,550	322,550	334,692	366,692	342,800	27,400
400.4	-0.1 ft	289,793	321,715	333,808	365,730	341,693	27,286
400.3	-0.2 ft	289,036	320,880	332,923	364,768	340,586	27,172
400.2	-0.3 ft	288,279	320,045	332,039	363,805	339,479	27,058
400.1	-0.4 ft	287,522	319,210	331,154	362,843	338,372	26,944
400.0	-0.5 ft	286,765	318,376	330,270	361,880	337,265	26,830
399.9	-0.6 ft	286,008	317,541	329,385	360,918	336,158	26,715
399.8	-0.7 ft	285,251	316,706	328,501	359,956	335,051	26,601
399.7	-0.8 ft	284,494	315,871	327,616	358,993	333,944	26,487
399.6	-0.9 ft	283,737	315,036	326,732	358,031	332,837	26,373
399.5	-1.0 ft	282,980	314,201	325,847	357,068	331,730	26,259
399.4	-1.1 ft	282,223	313,366	324,963	356,106	330,623	26,145
399.3	-1.2 ft	281,466	312,531	324,078	355,143	329,516	26,031
399.2	-1.3 ft	280,709	311,696	323,194	354,181	328,409	25,917
399.1	-1.4 ft	279,952	310,861	322,309	353,219	327,302	25,803
399.0	-1.5 ft	279,195	310,026	321,425	352,256	326,195	25,689

During refueling, canal level must be maintained between -0.5 and 0.0 on the SFP Level indicator (LI-2004).

(1) Tilt Pit volume from CR-ANO-1-2008-1859-CA2.

Initial Volume

$$\frac{(366{,}692 - 365{,}730)}{(366{,}692 - 366{,}527)} = \frac{(-0.1)}{X} \qquad \frac{962}{165} = \frac{-0.1}{X}$$

$$X = -0.017 \text{ feet}$$

CAUTION

Performance of this section requires verification that feed volume will not result in overflowing of the SFP or other attached volumes.

NOTE

- It is necessary to coordinate with Dry Fuel Personnel when making up to the Spent Fuel Pool during Dry Fuel Operations.
- Step 1.0 is solely performed to determine volume of boric acid at a known concentration to achieve a desired final SFP boron concentration, and generally would not be used.

1.0 IF it is desired to calculate the volume of boric acid required to achieve a desired final SFP concentration, THEN perform the following:

1.1 Determine initial SF Pool volume from TABLE 2. Interpolate if necessary.

1.1.1 IF appropriate, THEN add Refueling Canal and Incore Tank volume.

V_i = 362,843 gal = Initial Volume from TABLE 2

1.2 Record the following data:

C_i = 2300 ppmB = Initial SF Pool concentration

C_f = 2400 ppmB = Final desired SF Pool concentration

C_{fd} = 12,250 ppmB = Feed concentration to be added to SF Pool

1.3 Determine feed volume to be added to the SF Pool

$$V_{fd} = \frac{(V_i) \times (C_f - C_i)}{(C_{fd} - C_f)}$$

$$V_{fd} = \frac{(362{,}843) \times (2400 - 2300)}{(12{,}250 - 2400)}$$

V_{fd} = 3683.7 gal.

1.4 Determine final SF Pool volume

Final volume = (V_{fd}) + (V_i)

Final volume = (3683.7) + (362,843)

Final Volume = 366,527 gal.

NOTE

If final SF Pool level is determined to be greater than +1.0 ft or greater than zero when refueling, then the addition will have to be made in separate operations.

1.5 Determine final SF Pool level from TABLE 2, interpolate as necessary.

N/A 1.5.1 IF final volume greater than table values THEN a second addition will have to be done following a level reduction.

N/A 1.6 Perform the other sections of this Attachment as required.

N/A 2.0 IF needed,
THEN find the volume of feed (V_{fd}) AND use TABLE 1 for SF Pool gal/ft.
IF Refueling Canal or Incore Tank is connected to SF Cooling System
THEN add the appropriate gal/ft to the SF Pool gal/ft.

V_{fd} = [(Final level) - (Initial level)] x (gal/ft)

V_{fd} = [(N/A ft.) - (N/A ft.)] x (N/A gal/ft)

V_{fd} = N/A gal.

Unit 1 2016 NRC Exam

ADMIN JPM

A7

A1JPM-SRO-HCRD5 (A7)

UNIT: 1 REV # 2 DATE: ______________________________

TUOI NUMBER: A1JPM-SRO-HCRD5 (A7)

SYSTEM/DUTY AREA: ADMINISTRATIVE TOPIC – EQUIPMENT CONTROL

TASK: PERFORM REVIEW AND APPROVAL OF COMPONENT LIST AND SEQUENCE OF TAGGING FOR A INBOARD SEAL LEAK ON MAKEUP PURIFICATION PUMP P-36A

JTA#: ANO-RO-ADMIN-NORM-076

KA VALUE RO: 4.1 SRO: 4.3 KA REFERENCE: 2.2.13

APPROVED FOR ADMINISTRATION TO: RO:____________ SRO: X

TASK LOCATION: INSIDE CR:_____ OUTSIDE CR:_______ BOTH: X

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE:_________ SIMULATOR:__________ CLASSROOM: PERFORM

POSITION EVALUATED: RO:__________ SRO: X

ACTUAL TESTING ENVIRONMENT: SIMULATOR:_____ PLANT SITE:_____ CLASSROOM: X

TESTING METHOD: SIMULATE:_________ PERFORM:___________

APPROXIMATE COMPLETION TIME IN MINUTES: 15 MINUTES

REFERENCE(S): EN-OP-102, REV. 18, PROTECTIVE AND CAUTION TAGGING; P&ID M-231;

ELECTRICAL PRINT E-5 ONE LINE DRAWING FOR ENGINEERED SAFEGUARD BUSES A3 AND A4.

EXAMINEE'S NAME:________________________________ Logon ID: ____________________

EVALUATOR'S NAME:____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY:________________ UNSATISFACTORY:_________________

PERFORMANCE CHECKLIST COMMENTS:

____

____

____

____________ Start Time ____________ Stop Time ____________ Total Time

SIGNED _________________________________ DATE: _______________________

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:

The examiner should verify that the examinee has been briefed on the JPM Examination Briefing Sheet EN-TQ-114 Attachment 9.5 or NUREG-1021 App. E.

JPM INITIAL TASK CONDITIONS: The plant is at 100% power. A bad inboard seal leak is present on Makeup Purification Pump P-36A. An off shift RO has identified a list of components needed to isolate P-36A to stop the seal leak. No venting or draining of the pump is required at this time.

TASK STANDARD: The examinee has correctly identified the following three errors on the provided list and should not approve of sending this list to the tagging group. 1) MU-20A should be added instead of MU-20B 2) Breaker A-306 should be the first sequence component instead of third 3) MU-21A should be added to the tagout in the CLOSED position.

TASK PERFORMANCE AIDS: P&ID M-231 Makeup & Purification System Drawing; Electrical Print E-5 one line drawing for Engineered Safeguard Buses A3 and A4.

INITIATING CUE:

The SM/CRS has directed you to review the list of components needed to generate the tagout to electrically and mechanically isolate Makeup Purification Pump P-36A. Also review the tag hanging sequence. Either approve this list and provide it to the tagging group to prepare a tagout or identify and markup any errors, provide correction comments, and return them to be corrected.

CRITICAL ELEMENTS (C):_________

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UNSAT	N/A
NOTE: Provide examinee with a copy of E-Print E-5 and P&ID M-231					
(C)	1. Reviews controlled documentation to determine if Tag Sequence Item ‘1’ ‘MU-20B’ should be added to the requested tagout. (P&ID M-231)	Determines that P-36A Discharge Isolation **MU-20A** instead of **MU-20B** should be added to the tagout.	_____	_____	_____
Note: The Candidate may direct that a Caution Tag be added to be placed on the MU Purification Pump P-36A Remote Hand Switch.					
(C)	2. Reviews controlled documentation to determine if Tag Sequence Item ‘3’ ‘A-306’ should be added to the tagout. (E-Print E-5 or OP-1107.002 Attachment A) (Reference EN-OP-102 Rev. 18 Attachment 9.2 “Tagging Sequence”) See Answer Key	Determines that Electrical Circuit Breaker **A-306** will need to be **“Breaker Racked Down”** and added to the tagout. **However, per EN-OP-102 the breaker should be the first tag hung in the tagging sequence instead of third**.	_____	_____	_____
(C)	3. Reviews controlled documentation to determine if any other Items should be added to the requested tagout. (P&ID M-231)	Determines that P-36A Minimum Recirc Isolation **MU-21A** should be added to the tagout in the **Closed** position.	_____	_____	_____
(C)	4. After review of the tagging list, decides to approve or disapprove the suggested tagging list and sequence.	Determines that the errors need to be corrected and **should NOT** be approved and sent to the tagging group for tagout preparations.	_____	_____	_____
NOTE: Inform examinee that JPM is complete.					

END

EXAMINER ANSWER KEY

Correct Sequence	Tag Sequence	Component #	Component Name	Component Danger Tag Position
2	1	MU-20B(1)	MU Pump P-36A Discharge Isolation Valve	Closed
3	2	MU-18A (2)	MU Pump P-36A Suction Isolation Valve	Closed
1	3	A-306(3)	MU Pump P-36A Electrical Circuit Breaker	Breaker Racked Down

Approved and sent to tagging group for tagout preparation: YES ______ NO ______(5)
If "NO" Why Not? (6)

(1) In Tag Sequence 1 MU-20**A** should be added instead of MU-20**B** (C)
(2) No errors associated with Tag Sequence 2 but should be on the tagout.
(3) Breaker should be the **first** component in the tagging sequence instead of **third (see Correct Sequence)** (C)
(4) **Should** Determine that P-36A Minimum Recirc Isolation **MU-21A** should be added to the tagout in the **Closed** position. (C)
(5) **"NO"** Should be selected (C)
(6) Typos, error in the sequence of items, and missing a required component.

FYI – From EN-OP-102 (Rev 18) Attachment 9.2

8.0, Tagging Sequence:

8.1 All Tagouts require tags to be hung and cleared in the order specified on the Tang Hang sheet or Tags To Be Removed sheet. When no definitive order is required for certain components of a Tagout, the Operations Supervisor may specify a given order number for multiple components (e.g., multiple components listed on the Tagout may be given order number "5" when their sequence to each other is not important).

8.2 Recommended tagging order for pumps

A. Control Switch
B. Breaker for main power
C. Breakers for auxiliary power (motor heaters, oil pump, etc.)
D. Discharge valve
E. Suction valve
F. Other components within scope of Tagout

EXAMINEE'S COPY

JPM INITIAL TASK CONDITIONS:

- The plant is at 100% power.
- A bad inboard seal leak is present on Makeup Purification Pump P-36A.
- An off shift RO has identified a list of components needed to generate a tagout to isolate P-36A to stop the seal leak.
- No venting or draining of the pump is required at this time.

INITIATING CUE:

The SM/CRS has directed you to review the list of components needed to generate the tagout to electrically and mechanically isolate Makeup Purification Pump P-36A.

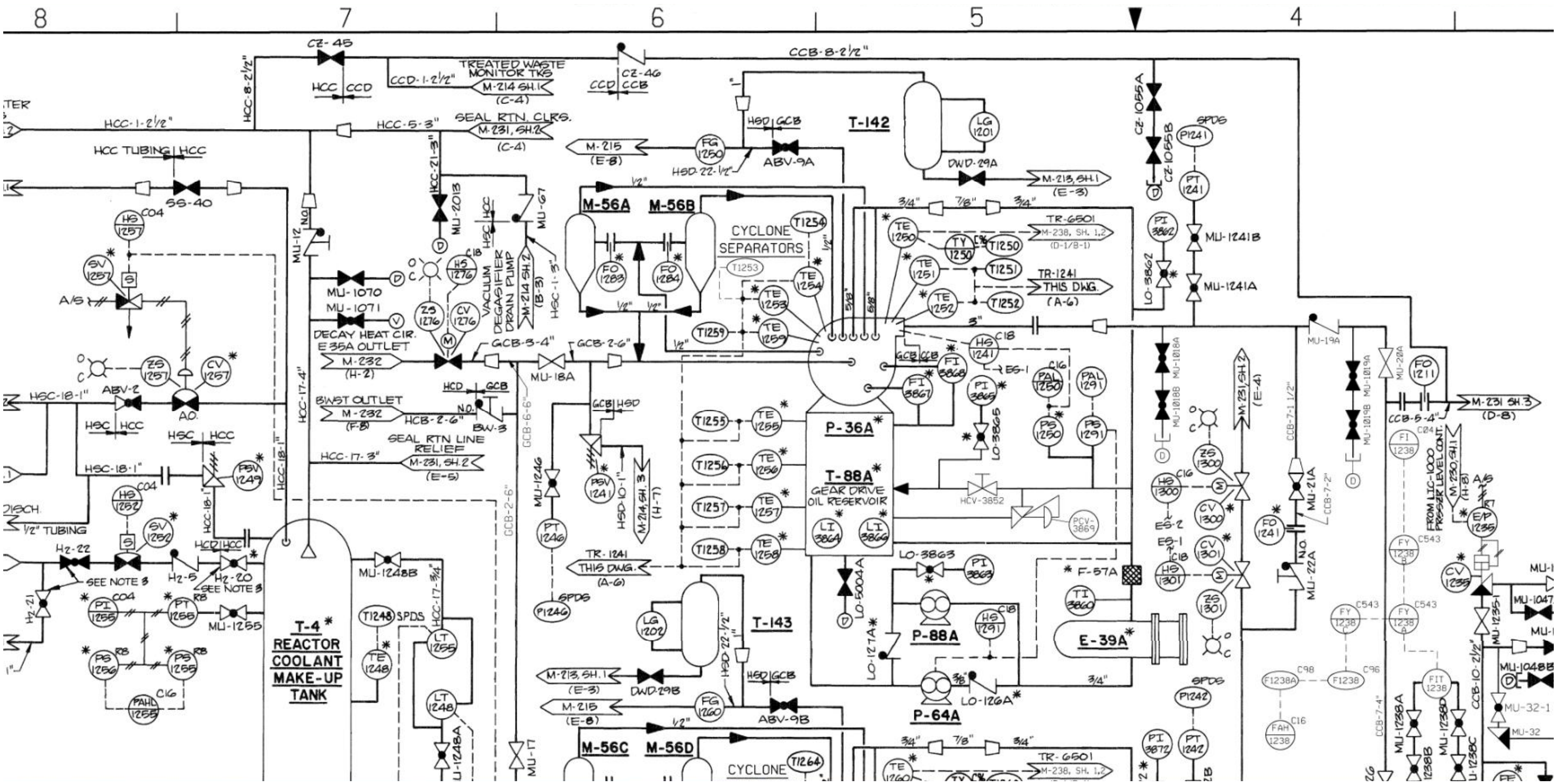
Also review the tag hanging sequence.

Either approve this list and provide it to the tagging group to prepare a tagout or identify and markup any errors, provide correction comments, and return them to be corrected.

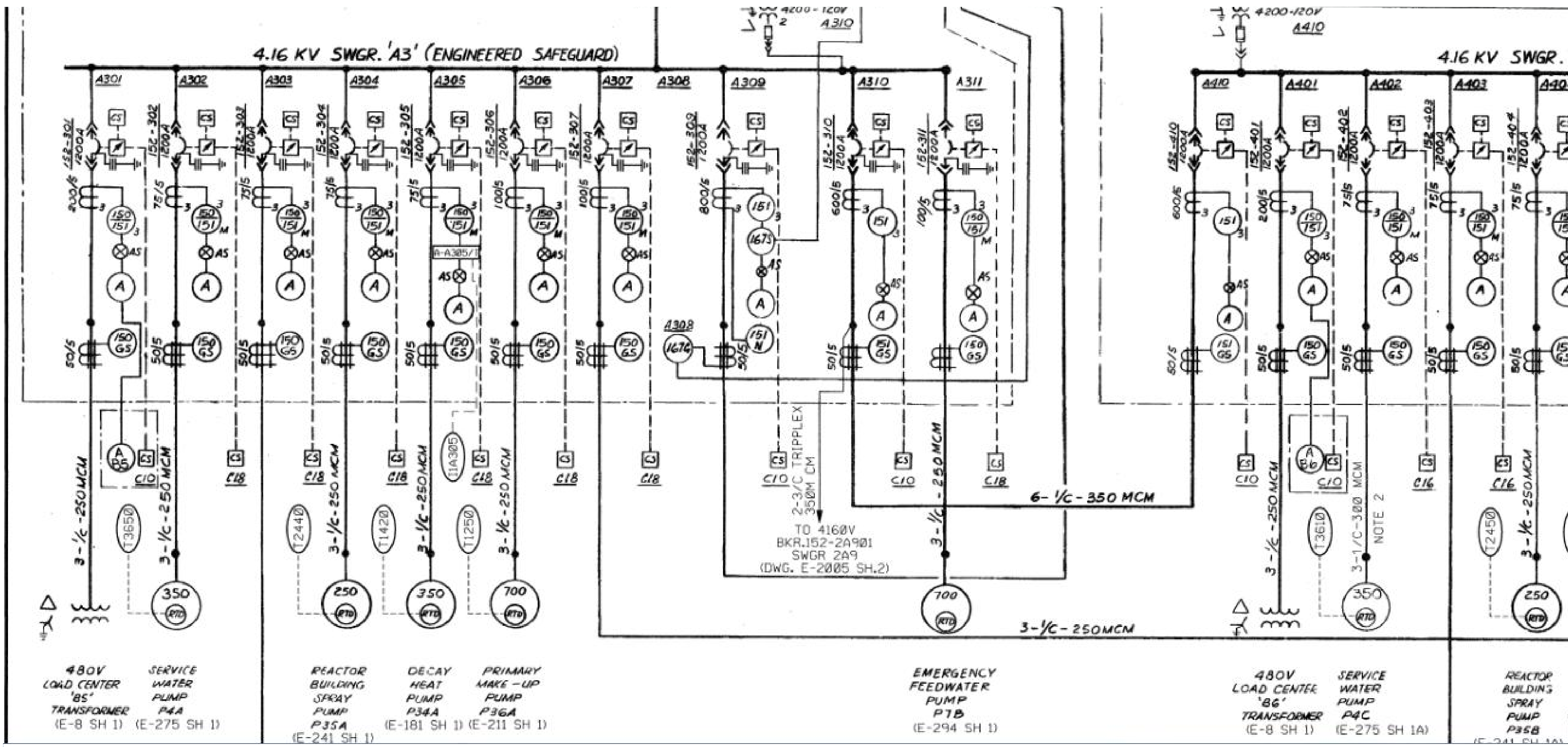
EXAMINEE'S COPY

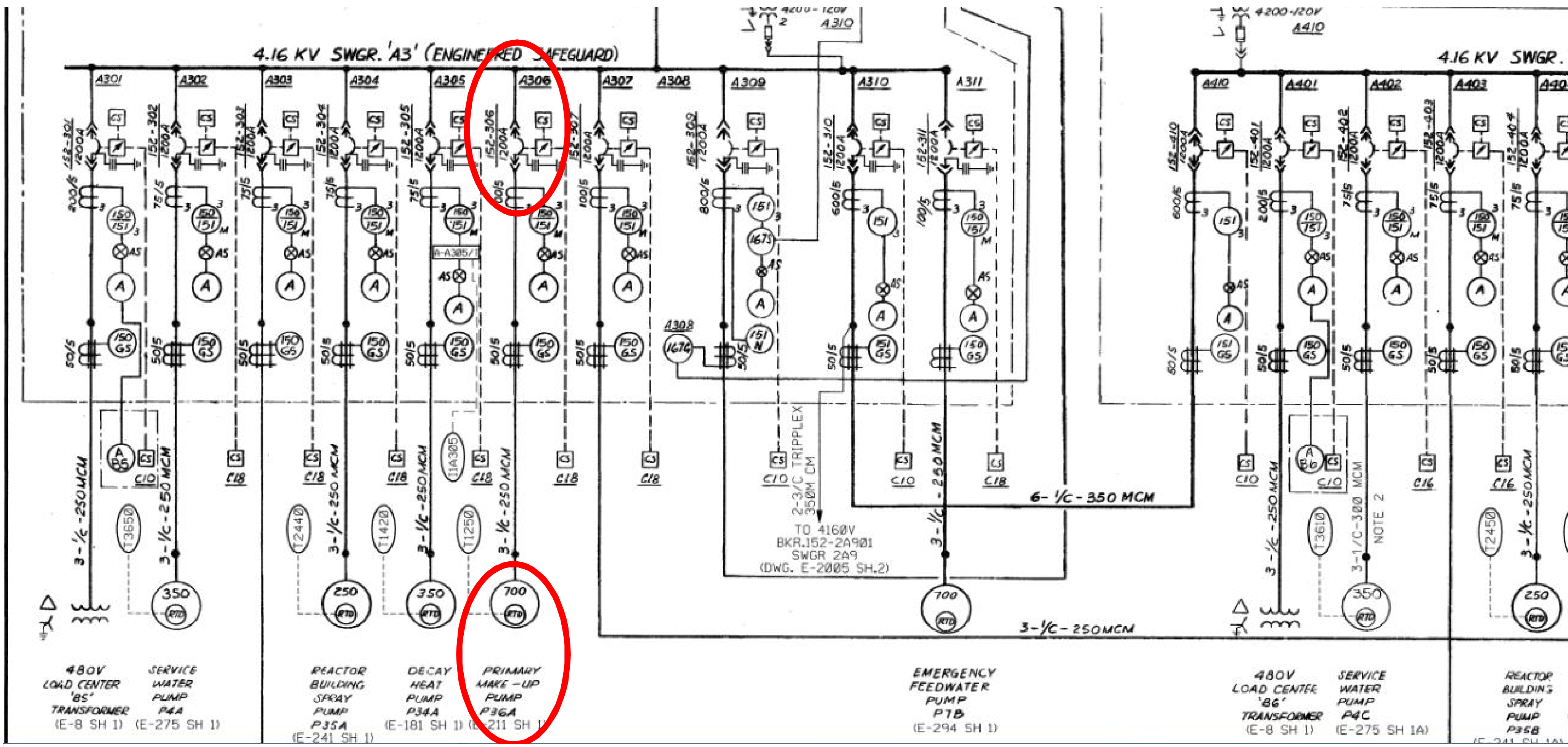
Tag Sequence	Component #	Component Name	Component Danger Tag Position
1	MU-20B	MU Pump P-36A Discharge Isolation Valve	Closed
2	MU-18A	MU Pump P-36A Suction Isolation Valve	Closed
3	A-306	MU Pump P-36A Electrical Circuit Breaker	Breaker Racked Down

Approved and sent to tagging group for tagout preparation: YES ______ NO_______.
If "NO" Why Not?

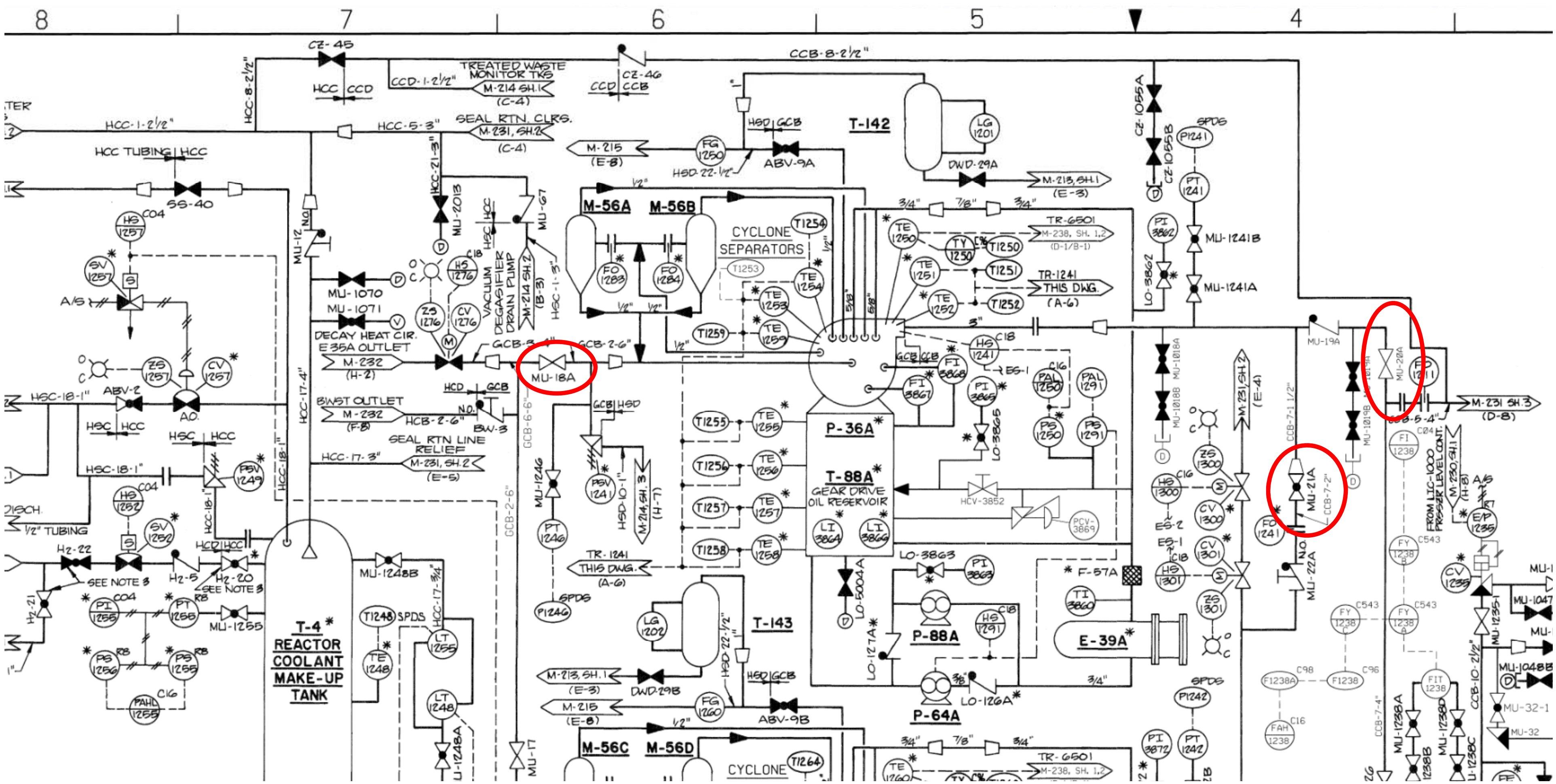


T-4
REACTOR COOLANT MAKE-UP TANK
T-142
T-143
M-56A
M-56B
M-56C
M-56D
CYCLONE SEPARATORS
P-36A
T-88A
GEAR DRIVE OIL RESERVOIR
P-88A
P-64A
E-39A
VACUUM DEGASIFIER DRAIN PUMP
TREATED WASTE MONITOR TKS
SEAL RTN. CLRS.
DECAY HEAT CIR. E35A OUTLET
BWST OUTLET
SEAL RTN LINE RELIEF
CCB-8-2½"
CCD-1-2½"
HCC-1-2½"
HCC-5-3"
HCC-17-3"
HSC-18-1"
GCB-3-4"
GCB-2-6"
ABV-9A
ABV-9B
ABV-2
SS-40
MU-18A
MU-19A
CZ-45
CZ-46
F-57A


4.16 KV SWGR. 'A3' (ENGINEERED SAFEGUARD)
4.16 KV SWGR.
480V LOAD CENTER 'B5' TRANSFORMER (E-8 SH 1)
SERVICE WATER PUMP P4A (E-275 SH 1)
REACTOR BUILDING SPRAY PUMP P35A (E-241 SH 1)
DECAY HEAT PUMP P34A (E-181 SH 1)
PRIMARY MAKE-UP PUMP P36A (E-211 SH 1)
EMERGENCY FEEDWATER PUMP P7B (E-294 SH 1)
480V LOAD CENTER 'B6' TRANSFORMER (E-8 SH 1)
SERVICE WATER PUMP P4C (E-275 SH 1A)
REACTOR BUILDING SPRAY PUMP P35B
TO 4160V BKR.152-2A901 SWGR 2A9 (DWG. E-2005 SH.2)
2-3/C TRIPPLEX 350M CM
6-1/C-350 MCM
3-1/C-250MCM
3-1/C-300 MCM
NOTE 2



EPrint E-5 Sheet 1



M-231, sh. 1

8.0 Tagging Sequence

8.1 All Tagouts require tags to be hung and cleared in the order specified on the Tag Hang sheet or Tags To Be Removed sheet. When no definitive order is required for certain components of a Tagout, the Operations Supervisor may specify a given order number for multiple components (e.g., multiple components listed on the Tagout may be given order number "5" when their sequence relative to each other is not important).

8.2 Recommended tagging order for pumps

A. Control switch.

B. Breaker for main power.

C. Breakers for auxiliary power (motor heater, oil pumps, etc.).

D. Discharge valve.

E. Suction valve.

F. Other components within scope of Tagout.

8.3 Recommended tagging order for generation equipment:

A. Prime mover.

B. Output breaker.

C. Field breaker.

D. Auxiliary electrical power.

E. Auxiliary mechanical equipment.

8.4 The recommended tagging order for draining equipment is:

A. Component isolation:

1) Close high pressure valve.

2) Close low pressure valve.

3) Open breaker for high pressure valve.

4) Open breaker for low pressure valve.

B. Perform draining evolution as applicable.

C. Tag a selected drain valve(s) in the required position for adequate drain down.

Tag a selected vent valve(s) in the required position for adequate vent.

Unit 1 2016 NRC Exam

ADMIN JPM

A8

A1JPM-SRO-RAD2 (A8)

UNIT: 1 REV # 2 DATE: ______________________________

TUOI NUMBER: A1JPM-SRO-RAD2 (A8)

SYSTEM/DUTY AREA: ADMINISTRATIVE TOPIC – RADIATION CONTROL

TASK: PROVIDED WITH THE DOSE HISTORY FOR 5 INDIVIDUALS DETERMINE WHICH OF THE 5 ARE ELIGIBLE FOR PERFORMING A CONTAINMENT ENTRY DURING AN UNUSUAL EVENT.

JTA#: ANO-RO-ADMIN-NORM-189

KA VALUE RO: 3.2 SRO: 3.7 KA REFERENCE: 2.3.4

APPROVED FOR ADMINISTRATION TO: RO:____________ SRO: X

TASK LOCATION: INSIDE CR:______ OUTSIDE CR:_______ BOTH: X

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE:_________ SIMULATOR:__________ CLASSROOM: PERFORM

POSITION EVALUATED: RO:__________ SRO: X

ACTUAL TESTING ENVIRONMENT: SIMULATOR:_____ PLANT SITE:_____ CLASSROOM: X

TESTING METHOD: SIMULATE:_________ PERFORM: X

APPROXIMATE COMPLETION TIME IN MINUTES: 20 MINUTES

REFERENCE(S): EN-RP-201 REV. 04, DOSIMETRY ADMINISTRATION; EN-RP-203 REV. 07, DOSE ASSESSMENT; OP-1903.033 CHANGE 023, PROTECTIVE ACTION GUIDELINES FOR RESCUE REPAIR & DAMAGE CONTROL TEAMS.

EXAMINEE'S NAME:_______________________________ Logon ID: ___________________

EVALUATOR'S NAME:____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY:________________ UNSATISFACTORY:_________________

PERFORMANCE CHECKLIST COMMENTS:

____

____

____________ Start Time ____________ Stop Time ____________ Total Time

SIGNED ________________________________ DATE: _______________________

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:

The examiner should verify that the examinee has been briefed on the JPM Examination Briefing Sheet EN-TQ-114 Attachment 9.5 or NUREG-1021 App. E.

JPM INITIAL TASK CONDITIONS: Unit 1 is at 100% Power. There are indications of a 30 gpm RCS leak in the Pressurizer area. Unit 1 has declared an Unusual Event for this condition.
Radiation Protection has completed a containment entry to assess the radiological conditions in the area of an isolation valve that can be used to isolate the leak on a PZR Pressure instrument tubing. Radiological conditions are as follows: General area external whole body dose rates near the isolation valve is 200 mrem/hour. Dose due to airborne radioactivity in the area of the isolation valve has been assessed using EN-RP-203 and will provide 0.1 ALI/hour (Annual Limit on Intake) of Committed Effective Dose Equivalent (CEDE. The task to isolate the leak will take 0.5 hours. No extension of any dose limits has been approved for this task. Operator 'E' is a Declared Pregnant Woman (DPW). All of the potential operators being accessed for this task have a NRC form 4 on file for all past exposure. All of the potential operators have a Lifetime TEDE (Total Effective Dose Equivalent) of Less than 10 Rem.

TASK STANDARD: The examinee has correctly identified that operators 'C' and 'D' can go into the Containment and isolate the 30 gpm RCS leak without exceeding their annual Total Effective Dose Equivalent (TEDE) limit .

TASK PERFORMANCE AIDS: Dose history for five operators with a spreadsheet to use in determining eligibility.

INITIATING CUE:

The Shift Manager has directed you to review the dose history of five Waste Control Operators and determine which one(s) have the available dose margin to go into Containment and isolate the RCS leak without exceeding the whole body TEDE required site dose limit for these plant conditions. Assume all dose is received at the valve during the isolation task. Assume no respiratory protection will be used for this task.

CRITICAL ELEMENTS (C):_________

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UNSAT	N/A
NOTE: Provide examinee with the dose history spreadsheet attached to this JPM.					
	1. Reviews controlled documentation to determine what the required TEDE dose limits are for the plant conditions.	Determines that the Routine Annual Administrative Guidelines of EN-RP-201 are in effect and the TEDE dose limit is 2000 mrem for operators 'A' through 'D' and 50mrem/month or 400 mrem/gestation period for operator 'E'.	_____	_____	_____
(C)	2. Calculates the effective whole body external dose for this task based on the general area dose rates of 200 mrem/hour.	Determines that the external whole body dose for this will be 200 mrem/hour x 0.5 hours = **100 mrem.**	_____	_____	_____
(C)	3. Calculates what the CEDE for 0.1 ALI/hour (Annual Limit on Intake) will be for the 0.5 hours task completion time.	Determines that the airborne CEDE for the area will be 0.1 x 5 Rem = 500 mrem/hour. Therefore the CEDE for this task will be 500 x 0.5 hour = **250 mrem.**	_____	_____	_____
(C)	4. Calculates the whole body TEDE for the task by adding the external whole body dose and the internal dose.	Determines that whole body TEDE dose is equal to 100 mrem + 250 mrem = **350 mrem**.	_____	_____	_____
(C)	5. Calculates the accumulated dose each operator would have if they completed the required isolation task.	(Operator 'A') 1800 + 350 = **2150 mrem** (Operator 'B') 1700 + 350 = **2050 mrem** (Operator 'C') 1600 + 350 = **1950 mrem** (Operator 'D') 1500 + 350 = **1850 mrem** (Operator 'E') 25 + 350 = **375 mrem**	_____	_____	_____

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UNSAT	N/A
(C)	6. Reviews what each operator's final whole body TEDE dose would be if they performed the task and compares this dose to the required limit for each operator and determines which ones are eligible or not eligible. (2000 mrem for operators 'A' through 'D' and 50mrem/month or 400 mrem/gestation period for operator 'E')	A) 2150 mrem > 2000 mrem therefore **Operator 'A' IS NOT eligible**. B) 2050 mrem > 2000 mrem therefore **Operator 'B' IS NOT eligible**. C) 1950 mrem < 2000 mrem Therefore **Operator 'C' IS eligible**. D) 1850 mrem < 2000 mrem Therefore **Operator 'D' IS eligible**. E) 375 mrem > 50mrem/month Therefore **Operator 'E' is NOT eligible.**	____	____	____

NOTE: Inform examinee that JPM is complete.

END

EXAMINER ANSWER KEY

Operator	Accumulated dose for the current Year	Accumulated dose if task is performed by operator	Eligible/Not Eligible
Operator A	1800 mrem	2150 mrem	Not Eligible (C)
Operator B	1700 mrem	2050 mrem	Not Eligible (C)
Operator C	1600 mrem	1950 mrem	Eligible (C)
Operator D	1500 mrem	1850 mrem	Eligible (C)
Operator E	25 mrem	375 mrem 350 mrem this month / task	Not Eligible (C)

Routine Annual Administrative Guidelines of EN-RP-201 are in effect and the whole body TEDE dose limit is 2000 mrem for operators 'A' through 'D' and 50 mrem/month or 400 mrem/gestation period for operator 'E'.

EXAMINEE'S COPY

JPM INITIAL TASK CONDITIONS:

- Unit 1 is at 100% Power.
- There are indications of a 30 gpm RCS leak in the Pressurizer area.
- Unit 1 has declared an Unusual Event for this condition.
- Radiation Protection has completed a containment entry to assess the radiological conditions in the area of an isolation valve that can be used to isolate the leak on a PZR Pressure instrument tubing.

- Radiological conditions are as follows:
    - General area external whole body dose rates near the isolation valve is 200 mrem/hour.
    - Dose due to airborne radioactivity in the area of the isolation valve has been assessed using EN-RP-203 and will provide 0.1 ALI/hour (Annual Limit on Intake) of Committed Effective Dose Equivalent (CEDE).

- The task to isolate the leak will take 0.5 hours.
- No extension of any dose limits has been approved for this task.
- Operator 'E' is a Declared Pregnant Woman (DPW).
- All of the potential operators being accessed for this task have a NRC form 4 on file for all past exposure.
- All of the potential operators have a Lifetime TEDE (Total Effective Dose Equivalent) of Less than 10 Rem.

INITIATING CUE:

The Shift Manager has directed you to review the dose history of five Waste Control Operators and determine which one(s) have the available dose margin to go into Containment and isolate the RCS leak without exceeding the whole body TEDE required site dose limit for these plant conditions.

Assume all dose is received at the valve during the isolation task.

Assume no respiratory protection will be used for this task.

EXAMINEE'S COPY

Operator	Accumulated dose for the current Year	Accumulated dose if task is performed by operator	Eligible/Not Eligible
Operator A	1800 mrem		
Operator B	1700 mrem		
Operator C	1600 mrem		
Operator D	1500 mrem		
Operator E	25 mrem		

Unit 1 2016 NRC Exam

ADMIN JPM

A9

ADMINISTRATIVE JOB PERFORMANCE MEASURE

UNIT: 1 REV # 1 DATE: ______________________________

TUOI NUMBER: A1JPM-SRO-PAR2 (A9)

SYSTEM/DUTY AREA: ADMINISTRATIVE TOPIC – EMERGENCY PROCEDURES/PLAN

TASK: DETERMINE A PROTECTIVE ACTION RECOMMENDATION

JTA#: ANO-SRO-EPLAN-EMERG-301, Issue Protective Action Recommendation to Offsite Authorities

KA VALUE RO: 2.4 SRO: 4.4 KA REFERENCE: 2.4.44 Knowledge of E Plan PAR

APPROVED FOR ADMINISTRATION TO: RO:____________ SRO: X

TASK LOCATION: INSIDE CR: X OUTSIDE CR:_________ BOTH:________

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE:______ SIMULATOR:__________ CLASSROOM: X

POSITION EVALUATED: RO: N/A SRO: X

ACTUAL TESTING ENVIRONMENT:

PLANT SITE:______ SIMULATOR:__________ CLASSROOM:________

TESTING METHOD: SIMULATE:_________ PERFORM:___________

APPROXIMATE COMPLETION TIME IN MINUTES: 15 MINUTES

REFERENCE(S): 1903.011 and 1903.010

EXAMINEE'S NAME:________________________________ Logon ID: _______________________

EVALUATOR'S NAME:____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY:________________ UNSATISFACTORY:_________________

PERFORMANCE CHECKLIST COMMENTS:

____

____

_____________ Start Time ____________ Stop Time ____________ Total Time

SIGNED ________________________________ DATE: _______________________

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:

The examiner shall ensure that the examinee has been briefed on the JPM Examination Briefing Sheet EN-TQ-114 Attachment 9.5 or NUREG 1021 Appendix E.

JPM INITIAL TASK CONDITIONS: A Failed Fuel condition has occurred on Unit One two hours ago. The EOF has been activated and is operational. A General Emergency has been declared per FG1, Loss of ANY two barriers AND loss or potential loss of third barrier, two minutes ago. Fuel failure is estimated to be 20%. A release is in progress. Wind direction is from 225 degrees. Dose assessment reports that dose rates at site boundary are expected to exceed EPA protective action guidelines within 30 minutes based on greater than 1,000 mrem TEDE. **THIS JPM IS TIME CRITICAL.**

TASK STANDARD: The examinee has correctly chosen and recommended PAR 7 with an evacuation of zones G and K; shelter zones J, L, and M and go indoors for zones H, I, N, O, P, Q, R, S, T, and U within or equal to 15 minutes.

TASK PERFORMANCE AIDS: 1903.011 Attachment 6

INITIATING CUE:

You are the EAL reviewer in the EOF and you are directed to recommend a Protective Action Recommendation to the EOF Director.

CRITICAL ELEMENTS (C) 2, 3

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UNSAT	N/A
	1. Consult Attachment 6 of 1903.011, Emergency Response/Notifications.	Turned to Attachment 6 of 1903.011, Protective Action Recommendations (PAR) for General Emergency.	_____	_____	_____
(C)	2. Recommend PAR based on event conditions.	Selected PAR No. 7 due to 1) First PAR for the event 2) LOSS of the containment fission product barrier based on Dose Assessment reports 3) Expected to exceed 1,000 mrem TEDE in 30 minutes	_____	_____	_____
(C)	3. Recommend PAR based on event conditions.	Stated, due to wind direction, evacuate zones G and K shelter zones J, L and M go indoors zones H, I, N, O, P, Q, R, S, T, and U	_____	_____	_____
NOTE: PAR 7 states that the EOF will recommend Evacuate 5-10 Miles Downwind when safer to do so. Examinee may state that zones J, L, and M will be evacuated when safer to do so.					
(C)	4. Provides the PAR recommendations within the procedural required time limit.	PAR recommendations provided within or equal to 15 minutes of the start of the JPM after reading and understanding the Initiating cue.	_____	_____	_____

END

KEY

PAR Recommendation ______7__________ (C)

Evacuate Zones __G and K________________________ (C)

Shelter Zones ___J, L, and M________________________ (C)

Go indoors Zones _H, I, N, O, P, Q, R, S, T, and U__(C)

JPM Start Time (after candidate understands the initiating cue) ___________.

JPM Stop Time ____________

JPM Duration ______________ (C) (≤ 15 minutes)

EXAMINEE'S COPY

JPM INITIAL TASK CONDITIONS:

- A Failed Fuel condition has occurred on Unit One two hours ago.
- The EOF has been activated and is operational.
- A General Emergency has been declared per FG1, Loss of ANY two barriers AND loss or potential loss of third barrier, two minutes ago.
- Fuel failure is estimated to be 20%.
- A release is in progress.
- Wind direction is from 225 degrees.
- Dose assessment reports that dose rates at site boundary are expected to exceed EPA protective action guidelines within 30 minutes based on greater than 1,000 mrem TEDE.
- **THIS JPM IS TIME CRITICAL**

INITIATING CUE:

You are the EAL reviewer in the EOF and you are directed to recommend a Protective Action Recommendation to the EOF Director and the initial zones to be evacuated, sheltered or go indoors.

Time starts after reading the "INITIATING CUE"

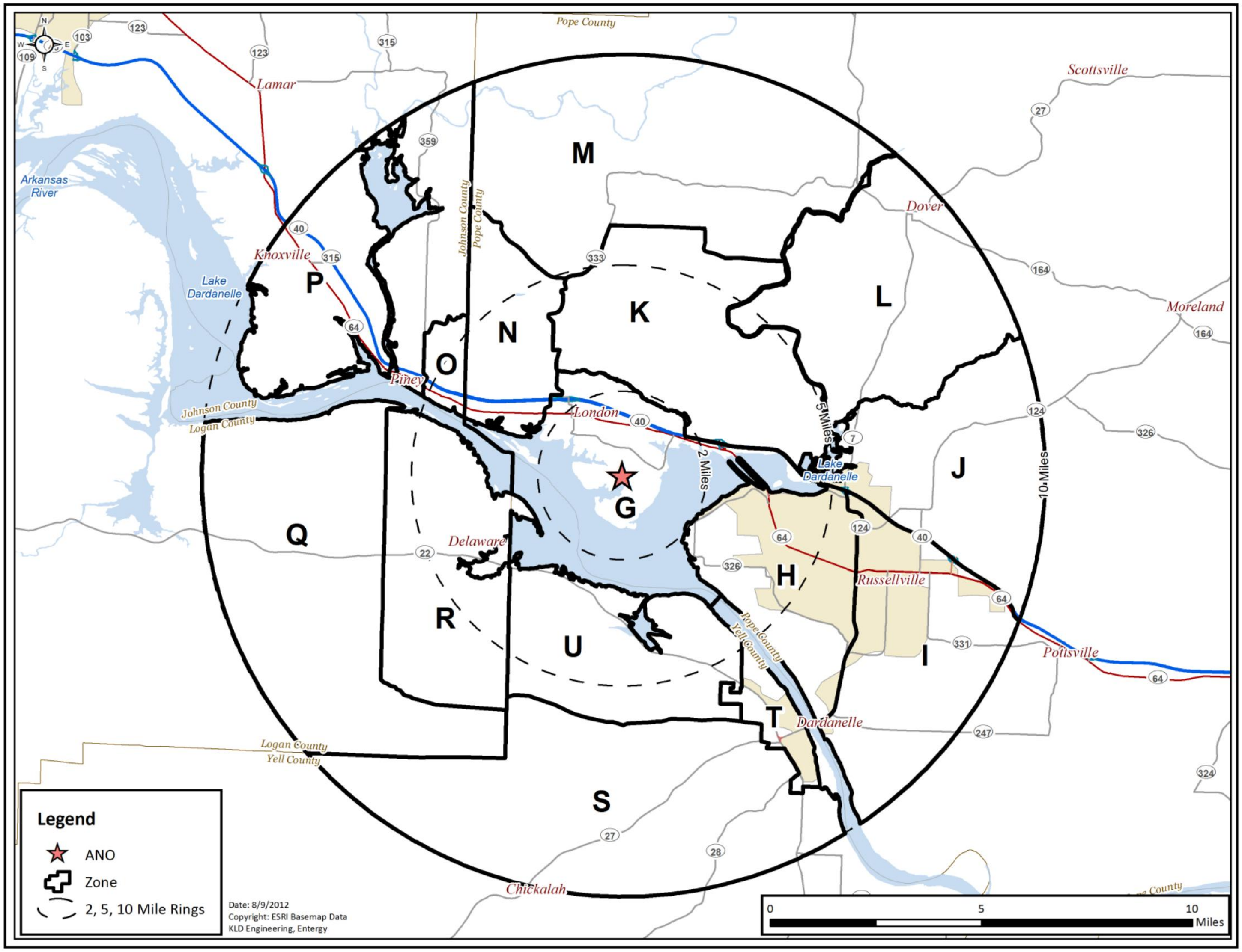
PAR Recommendation _______________

Evacuate Zones ____

Shelter Zones ____

Go indoors Zones ____

FIGURE 6-1
ANO EPZ Zones



Facility: **Arkansas Nuclear One – Unit 1** Date of Examination: **8/22/2016**

Exam Level: RO ☐ SRO-I ☐ SRO-U ☐ Operating Test No.: **2016-1**

Control Room Systems:* 8 for RO; 7 for SRO-I; 2 or 3 for SRO-U

System / JPM Title	Type Code*	Safety Function
S1 API-RPI Comparison 014 A1.02 (RO 3.2 / SRO 3.6) **RO**	N/S	1
S2 Throttle HPI following ESAS Actuation 013 A4.01 (RO 4.5 / SRO 4.8) **RO / SRO-U / SRO-I**	A/M/EN/L/S	2
S3 Manually Control RCS Pressure with a Pressurizer Spray Valve Failure 010 A3.02 (RO 3.6 / SRO 3.5) **RO / SRO-I**	A/D/S	3
S4 Shutdown RCP P-32A at Power 003 A2.02 (RO 3.7 / SRO 3.9) **RO / SRO-I**	A/D/E/S	4P
S5 Pump the Quench Tank 007 A1.01 (RO 2.9 / SRO 3.1) **RO / SRO-I**	D/S	5
S6 Transfer Buses From Unit Aux Transformer to a Startup Transformer 062 A4.07 (RO 3.1 / SRO 3.1) **RO / SRO-I**	A/N/S	6
S7 Remove Channel of RPS from Manual Bypass 012 A4.03 (RO 3.6 / SRO 3.6) **RO / SRO-U / SRO-I**	D/S	7
S8 Shift ICW Pumps 008 A4.01 (RO 3.3 / SRO 3.1) **RO / SRO-I**	D/S	8

In-Plant Systems* (3 for RO); (3 for SRO-I); (3 or 2 for SRO-U)		
P1 Purge the Main Generator During Emergency Conditions (A1JPM-RO-GEN02) 055 EA1.04 (RO 3.5 / SRO 3.9) **RO / SRO-U / SRO-I**	A/M/E/L	8
P2 Respond to Control Rod Drive Stator High Temperature (A1JPM-RO-CRD04) 001 A2.01 (RO 3.1 / SRO 3.7) **RO / SRO-U / SRO-I**	D/E	1
P3 Align T-16A (Treated Waste Monitoring Tank) for Recirc / Sample 068 A2.02 (RO 2.7 / SRO 2.8) **RO / SRO-U / SRO-I**	A/N/R	9

* All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all five SRO-U systems must serve different safety functions; in-plant systems and functions may overlap those tested in the control room.

* Type Codes	Criteria for RO / SRO-I / SRO-U
A)lternate path	4-6 **(6)** / 4-6 **(6)** / 2-3 **(3)**
(C)ontrol room	≥ 8 **(8)** / ≥ 7 **(7)** / 2-3 **(2)**
(D)irect from bank	≤ 9 **(6)** / ≤ 8 **(6)** / ≤ 4 **(2)**
(E)mergency or abnormal in-plant	≥ 1 **(3)** / ≥ 1 **(3)** / ≥ 1 **(2)**
(EN)gineered safety feature	≥1 **(1)** / ≥1 **(1)** / ≥ 1 **(1)** (control room system)
(L)ow-Power / Shutdown	≥ 1 **(2)** / ≥ 1 **(2)** / ≥ 1 **(2)**
(N)ew or (M)odified from bank including 1(A)	≥ 2 **(5)** / ≥ 2 **(4)** / ≥ 1 **(3)**
(P)revious 2 exams	≤ 3 **(0)** / ≤ 3 **(0)** / ≤ 2 **(0)** (randomly selected)
(R)CA	≥ 1 **(1)** / ≥ 1 **(1)** / ≥ 1 **(1)**
(S)imulator	

Unit 1 2016 NRC Exam

Simulator JPM

S1

JOB PERFORMANCE MEASURE

Unit: 1 Rev # 53 Date: 8/4/2016

JPM ID: A1JPM-RO-CRD07 (S1)

System/Duty Area: Rod Position Indication System (RPIS)

Task: Perform Absolute And Relative Position Indication Comparison

JTA# ANO1-RO-CRD-SURV-13

KA Value RO 3.2 SRO 3.6 KA Reference: 014-A1.02

Approved For Administration To: RO X SRO X

Task Location: Inside CR X Outside CR ______ Both ______

Suggested Testing Environment and Method (Perform or Simulate):

Plant Site: ______ Simulator: Perform Lab: ______

Position Evaluated: RO: ______ SRO: ______

Actual Testing Environment: Plant Site ______ Simulator ______ Lab ______

Testing Method: Perform ______ Simulate ______

Approximate Completion Time in Minutes: 15 Minutes

Reference(s): OP-1105.009 CRD SYSTEM OPERATING PROCEDURE SUPPLEMENT 1 (REV. 51)

Examinee's Name: ______ ID: ______

Evaluator's Name: ______

The Examinee's performance was evaluated against the standards contained in this JPM and is determined to be:

Satisfactory: ______ Unsatisfactory: ______

Performance Checklist Comments:

______

______

______

Start Time ______ Stop Time ______ Total Time ______

*Signed ______ Date ______

*Signature indicates this JPM has been compared to its applicable procedure by a qualified individual (not the examinee) and is current with that revision.

JPM ID: A1JPM-RO-CRD07

THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:

The examiner shall ensure that the examinee has been briefed on the JPM Examination Briefing Sheet EN-TQ-114 Attachment 9.5 or NUREG 1021 Appendix E.

JPM INITIAL TASK CONDITIONS:

Unit 1 is at 100% power.
No control rod motion expected for the duration of the test

TASK STANDARD:

The applicant completed Section 3.0 of 1105.009 Supplement 1, and properly verified operability of API and RPI.

TASK PERFORMANCE AIDS:

OP-1105.009 CRD SYSTEM OPERATING PROCEDURE SUPPLEMENT 1 (REV. 51)

INITIATING CUE: CRS directs you to perform “ABSOLUTE & RELATIVE POSITION INDCIATION COMPARISON” per Supplement 1 of OP-1105.009 using the plant computer.

Suggested simulator setup:
100% power steady state with no expected rod motion (IC 278)
Verify PI Panel selected to ABSOL, especially during reset in between JPMs.
Verify PI Panel meters are not stuck following each reset

JPM ID: A1JPM-RO-CRD07

INITIATING CUE: CRS directs you to perform "ABSOLUTE & RELATIVE POSITION INDCIATION COMPARISON" per Supplement 1 of OP-1105.009 using the plant computer.

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
(C)	2.1.1. Using the Plant Computer, obtain an API/RPI printout by performing "Obtaining API/RPI Printout" section of OP-1105.009 **POSITIVE CUE:** **API/RPI printout obtained per OP-1105.009. (Informational Use)**	Applicant may reference OP-1105.009 Section 19.0 or may perform from memory the following steps to obtain a printout of both the API and RPI reports for comparison.	____	____	___
EXAMINER NOTE: There are two different ways to obtain the printout for this JPM. The hot key function (Method 2) is simpler and provides a better print out for the comparison. The following steps describe both methods and either one can be performed without referencing the procedure. FYI – EC60523 is **NOT** installed.					
METHOD 1 (Plant Computer)					
	19.1.1. IF desired to use the NASP function, THEN perform the following: A. Note position of PI Panel POSITION SELECT switch: ABSOL or REL. B. On PMS, select NAS. C. On PMS, select N4. D. Depress "F4" E. Depress 1 (CRD Position Report). F. Depress "Enter" to print. G. Depress "Enter" to select local printer. H. Obtain printout. I. Verify the following on printout: • Correct time • Correct date J. Mark printout with appropriate position: ABSOL or REL. K. Place PI Panel POSITION SELECT switch to opposite position: REL or ABSOL. L. Depress "F4" M. Depress 1 (CRD Position Report). N. Depress "Enter" to print.	Applicant obtains printout for currently selected REL and ABSOL.	____	____	___

JPM ID: A1JPM-RO-CRD07

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
	O. Depress “Enter” to select local printer. P. Obtain printout. Q. Mark printout with appropriate position: REL or ABSOL. R. Verify PI Panel POSITION SELECT switch in ABSOL. **<u>POSITIVE CUE:</u>** **Printout obtained for the currently selected REL or ABSOL.**	(Continued) Applicant obtains printout for currently selected REL and ABSOL.	_____	_____	___
	<u>METHOD 2 (Hot Key)</u>				
	19.1.2. <u>IF</u> desired to use function hot key, <u>THEN</u> perform the following: A. Verify PI Panel POSITION SELECT switch in ABSOL. B. Depress the API/RPI labeled hot key. C. Depress “ENTER” to select each default value. D. Enter PI Panel POSITION SELECT switch position. E. Place PI Panel POSITION SELECT switch to REL. F. Select “YES”. G. Select F3 to print. H. Obtain printout. I. Verify the following on printout: • Correct time • Correct date J. Verify PI Panel POSITION SELECT switch in ABSOL. **<u>POSITIVE CUE:</u>** **Printout obtained for the currently selected REL or ABSOL.**	Applicant obtains printout for currently selected REL and ABSOL.	_____	_____	___
	<u>EXAMINER NOTE</u>: The applicant should return to Supplement 1				

JPM ID: A1JPM-RO-CRD07

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
(C)	2.1.2 Compare RPI printout with RPI PI meter indications and determine if > 4% difference exists for any control rod. **<u>POSITIVE CUE:</u>** **REL selected on the PI panel and verifies all RPI printout readings are within 4% of RPI PI meter indications.**	Applicant selects REL on the PI panel and verifies all RPI printout readings are within 4% of RPI PI meter indications.	____	____	___
(C)	2.1.3 Perform API comparison as follows: A. Place PI Panel POSITION SELECT switch to ABSOL. B. Compare API printout with API PI meter indications and determine if > 4% difference exists for any control rod. **<u>POSITIVE CUE:</u>** **ABSOL selected on the PI panel and verifies all API printout readings are within 4% of API PI meter indications.**	Applicant selects ABSOL on the PI panel and verifies all API printout readings are within 4% of API PI meter indications.	____	____	___

JPM ID: A1JPM-RO-CRD07

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
(C)	2.1.4 Compare API and RPI computer printout and determine if ≥ 2% difference exists between individual API and RPI rod positions. A. Record results of RPI comparison, API comparison, and API/RPI comparison in Section 3.0. **<u>POSITIVE CUE:</u>** **API and RPI computer printouts are within 2% of each other for all rods.**	Applicant compares API and RPI computer printout and determine if ≥2% difference exists between individual API and RPI rod positions.	_____	_____	___
(C)	2.2 Compare API for each control rod to the associated Group Average by using plant computer or PI meter indication and determine if ≥ 3% difference exists. 2.2.1 Record results in Section 3.0. **<u>POSITIVE CUE:</u>** **All API and Group Averages are within 3% of each other.** **Recorded results of RPI comparison, API comparison, and API/RPI comparison in Section 3.0**	Applicant compared API for each control rod to the associated Group Average by using plant computer or PI meter indication and determine if ≥3% difference exists and recorded results of RPI comparison, API comparison, and API/RPI comparison in Section 3.0	_____	_____	___
<u>EXAMINER NOTE</u>: This next step is N/A					
	2.3 <u>IF</u> neither the plant computer nor SPDS is available, <u>THEN</u> use PI Panel indication to determine if ≥4% difference between API and RPI exists for any control rod. 2.3.1 Record results in Section 3.0. **<u>EXAMINER CUE:</u>** **Plant Computer is available.**	Applicant will N/A this step	_____	_____	___

JPM ID: A1JPM-RO-CRD07

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
(C)	2.4. Check each safety rod fully withdrawn by one of the following: • 100% indication lamp on PI Panel is lit. • >98.5% withdrawn by available API. 2.4.1 Record results in Section 3.0. **POSITIVE CUE:** **All 100% indication lamps lit on PI Panel for safety rods.** **Recorded results of Safety Rods fully withdrawn in Section 3.0**	Applicant verified either 100% indication lamp on PI Panel is lit OR >98.5% withdrawn by available API and recorded results in Section 3.0.	____	____	___
	2.5. Verify PI Panel POSITION SELECT switch to ABSOL. **POSITIVE CUE:** **ABSOL selected on the PI panel.**	Applicant selects ABSOL on the PI panel.	____	____	___
	2.6. Test PI Panel lamps. 2.6.1. Record results of PI Panel light test in Section 3.0. **POSITIVE CUE:** **All PI panel lights lit during testing and results recorded in Section 3.0**	Applicant tests all lamps on the PI panel and recorded results of PI Panel light test in Section 3.0.	____	____	___

JPM ID: A1JPM-RO-CRD07

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
(C)	2.7 Verify Regulating Groups 5, 6, and 7 within the sequence and overlap limits specified in the COLR. 2.7.1 Record results **POSITIVE CUE:** **All Regulating Groups 5, 6, and 7 within the sequence and overlap limits specified in the COLR and results recorded in Section 3.0**	Applicant verified all Regulating Groups 5, 6, and 7 within the sequence and overlap limits specified in the COLR and recorded results of Regulating Groups 5, 6, and 7 within the sequence and overlap limits specified in the COLR. in Section 3.0	____	____	___
(C)	2.8 Verify Regulating Groups 5, 6, and 7 meet the insertion limits specified in the COLR. 2.8.1 Record results in Section 3.0 **POSITIVE CUE:** **All Regulating Groups 5, 6, and 7 within the insertion limits specified in the COLR and results recorded in Section 3.0.**	Applicant verified all Regulating Groups 5, 6, and 7 meet the insertion limits specified in the COLR and recorded results of Regulating Groups 5, 6, and 7 within the insertion limits specified in the COLR in Section 3.0.	____	____	___

JPM ID: A1JPM-RO-CRD07

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
(C)	2.9 Verify APSRs within acceptable limits specified in the COLR. 2.9.1 Record results in Section 3.0 **POSITIVE CUE:** **All APSRs within acceptable limits specified in the COLR and recorded in Section 3.0**	Applicant verified all APSRs within acceptable limits specified in the COLR and recorded results of APSRs being within acceptable limits specified in the COLR in Section 3.0.	____	____	___
	2.10 If a known rod inoperability condition exists, THEN document in Section 3.0. **EXAMINER CUE:** **No other known conditions exist.**	Applicant will place a check mark in Section 3.0 indicating no other known conditions exist.	____	____	___
	Applicant will sign and date for performing Section 3.0 **POSITIVE CUE:** **Section 3.0 properly filled out, signed and dated.**	Applicant signed and dated for performing Section 3.0	____	____	___
EXAMINER NOTE: If asked inform the applicant that the CRS will complete Section 4.0 JPM is complete.					

END

JPM ID: A1JPM-RO-CRD07

INITIAL CONDITIONS:

Unit 1 is at 100% power and 250 EFPD.
No control rod motion expected for the duration of the test

INITIATING CUE:

CRS directs you to perform:
“ABSOLUTE & RELATIVE POSITION INDCIATION COMPARISON” per Supplement 1 of OP-1105.009 using the plant computer.

SUPPLEMENT 1

ABSOLUTE AND RELATIVE POSITION INDICATION COMPARISON

This test demonstrates operability of control rod drive system absolute and relative rod position indication, verifies that safety rods are fully withdrawn, and verifies that all rods are within 6.5% of their group average. This test satisfies SR 3.1.4.1, SR 3.1.5.1, SR 3.1.6.1, SR 3.1.7.1 , SR 3.2.1.1 , SR 3.2.1.2 and SR 3.2.2.1.

1.0 INITIAL CONDITIONS

1.1 Control rod drive system is energized.

1.2 At least one of the following satisfied:

- Plant conditions are such that no control rod motion is expected for the duration of the test.
- Diamond Panel is in MANUAL.

2.0 TEST METHOD

CAUTION

The Plant Computer program for API/RPI comparison has default values for deviation limits. It is permissible for the operator to adjust the limits; however, the limits shall be equal to or less than the limits specified in this surveillance.

NOTE

- If Plant Computer or SPDS is used and Control rod motion occurs prior to completing printout to PI meter comparisons, new printouts should be obtained.
- If Plant Computer or SPDS is used and Control rod motion occurs while obtaining API and RPI printouts, new printouts should be obtained.
- Plant Computer compares API to RPI, and both API and RPI to the Group Avg. Deviations greater than the limits are flagged with ">>>>>". Bad signals are flagged as "B" and their deviations are flagged "****". Asymmetric rods, >6.5% are flagged "!!!!!" and the value will not be used in the Group Avg.
- A rod is considered inoperable if it can not be located with API, RPI or IN/OUT-LIMIT lights. Refer to TS 3.1.7.

> **NOTE**
> Completion of step 2.1 or 2.3 satisfies shiftly rod checks per SR 3.1.4.1, SR 3.1.6.1, and SR 3.1.7.1.

2.1 IF either the plant computer or SPDS is available,
THEN perform API/RPI comparison as follows.
OTHERWISE N/A this section.

2.1.1 Obtain an API/RPI printout from either the plant computer or SPDS by performing "Obtaining API/RPI Printout" section of this procedure.

2.1.2 Compare RPI printout with RPI PI meter indications and determine if > 4% difference exists for any control rod.

2.1.3 Perform API comparison as follows:

> **NOTE**
> If EC60523 is installed, then PI Panel POSITION SELECT switch is mounted on back of C74 in Computer Room.

A. Place PI Panel POSITION SELECT switch to ABSOL.

B. Compare API printout with API PI meter indications and determine if > 4% difference exists for any control rod.

2.1.4 Compare API and RPI computer printout and determine if ≥ 2% difference exists between individual API and RPI rod positions.

A. Record results of RPI comparison, API comparison, and API/RPI comparison in Section 3.0.

> **NOTE**
> Control Rod Drive Malfunction Action (1203.003) has direction for Control rod misalignments >5%.

2.2 Compare API for each control rod to the associated Group Average by using plant computer or PI meter indication and determine if ≥ 3% difference exists.

2.2.1 Record results in Section 3.0.

NOTE

- Printouts are not needed for records.
- If EC60523 is installed, then PI Panel POSITION SELECT switch is mounted on back of C74 in Computer Room.

2.3 IF neither the plant computer nor SPDS is available, THEN use PI Panel indication to determine if ≥4% difference between API and RPI exists for any control rod.

2.3.1 Record results in Section 3.0.

NOTE

Completion of the next step satisfies shiftly safety rod checks per SR 3.1.5.1.

2.4 Check each safety rod fully withdrawn by one of the following:

- 100% indication lamp on PI Panel is lit.
- ≥98.5% withdrawn by available API.

2.4.1 Record results in Section 3.0.

2.5 Verify PI Panel POSITION SELECT switch in ABSOL.

2.6 Test PI Panel lamps.

2.6.1 Record results in Section 3.0.

NOTE

Completion of the next step satisfies shiftly verification of regulating groups within sequence and overlap limits per SR 3.2.1.1.

2.7 Verify Regulating Groups 5, 6, and 7 within the sequence and overlap limits specified in the COLR.

2.7.1 Record results in Section 3.0.

> **NOTE**
> Completion of the next step satisfies shiftly verification of regulating groups meeting insertion limits per SR 3.2.1.2.

2.8 Verify Regulating Groups 5, 6, and 7 meet the insertion limits specified in the COLR.

2.8.1 Record results in Section 3.0.

> **NOTE**
> Completion of the next step satisfies shiftly verification of APSRs within acceptable limits per SR 3.2.2.1.

2.9 Verify APSRs within acceptable limits specified in the COLR.

2.9.1 Record results in Section 3.0.

2.10 IF a known rod inoperability condition exists,
THEN document in Section 3.0.

3.0 ACCEPTANCE CRITERIA

Test Quantity	Measured Values	Limiting Range For Operability	Is Data Within Limiting Range? (Circle YES, NO or N/A)
RPI printout to PI Comparison	(✓) if ≤ 4% difference ( )	≤ 4% difference	YES N/A (1) NO
API printout to PI Comparison	(✓) if ≤ 4% difference ( )	≤ 4% difference	YES N/A (1) NO
API to RPI printout Comparison	(✓) if ≤ 2% difference ( )	≤ 2% difference	YES N/A (1) NO
API to Group Average Comparison	(✓) if < 3% difference ( )	< 3% difference	YES NO
API to RPI Meter Comparison	(✓) if ≤ 4% difference ( )	≤ 4% difference	YES N/A (2) NO
Safety Rod status	(✓) if ALL fully withdrawn ( )	ALL fully withdrawn	YES NO
PI Panel Lamp Test	(✓) if ALL Lamps light ( )	N/A	N/A
Regulating Group alignment	(✓) if Reg Groups within sequence and overlap limits in COLR ( )	Reg Groups within sequence and overlap limits in COLR	YES NO
Regulating Group insertion	(✓) if Reg Groups meet Insertion limits in COLR ( )	Reg Groups Groups meet Insertion limits in COLR	YES NO
APSR position	(✓) if APSRs are positioned per COLR ( )	APSRs are positioned per COLR	YES NO
Other known inoperability condition	(✓) if NO known conditions exist ( )	No known condition	YES NO

Note 1 - Data Within Limiting Range will be N/A only if Plant Computer or SPDS is unavailable.

Note 2 - Data Within Limiting Range will be N/A if Plant Computer or SPDS is available.

3.1 IF “NO” is circled in table above,
THEN take one of the following actions:

3.1.1 IF any safety rod is NOT fully withdrawn,
THEN refer to TS 3.1.5.

3.1.2 IF the condition has been previously identified,
THEN verify the condition and the corrective action taken are documented in section 4.0.

3.1.3 IF the condition has NOT been previously identified,
THEN perform the following:

A. Correct the condition per the applicable step below, if possible:

- IF rod is misaligned,
THEN realign using Attachment C, “Adjusting Control Rod/APSR Position For Improved Alignment” of this procedure for misalignments <5% OR Control Rod Drive Malfunction Action (1203.003) if ≥ 5%.

- IF RPI is misaligned or a rod is realigned per step A above,
THEN correct RPI position indication per "Relative Position Indication Adjustment" section of this procedure.

- IF other unsatisfactory condition is discovered,
THEN initiate corrective action.

B. Record both the condition and the corrective action taken in section 4.0.

3.1.4 IF any rod can NOT be located with API, RPI, or IN/OUT LIMIT light,
THEN immediately notify CRS/SM and initiate a Condition Report. Reference TS 3.1.7.

3.1.5 IF all lamps did NOT illuminate during PI Panel Lamp Test,
THEN initiate corrective action.

Performed By ____________________________ Date ______________

SUPPLEMENT 1

4.0 SUPERVISOR REVIEW AND ANALYSIS

(circle one)

4.1 Have the "Acceptance Criteria" in section 3.0 been satisfied? YES NO

4.2 IF answer to 4.1 is "NO",
THEN describe the action taken below.

____

____

____

____

____

____

____

4.3 Has this equipment been proven operable per the Acceptance Criteria?

....YES NO

4.4 IF this surveillance found a condition that has NOT been previously identified,
THEN verify a copy of this surveillance is forwarded to Reactor and System Engineers.

SUPERVISOR _____________________________________ DATE ___________

19.0 Obtaining API/RPI Printouts (Informational use)

CAUTION

The Plant Computer program for API/RPI comparison has default values for deviation limits. It is permissible for the operator to adjust the limits; however, the limits shall be equal to or less than the limits specified in this surveillance.

NOTE

- If Plant Computer or SPDS is used and Control rod motion occurs prior to completing printout to PI meter comparisons, new printouts should be obtained.
- If Plant Computer or SPDS is used and Control rod motion occurs while obtaining API and RPI printouts, new printouts should be obtained.
- Plant Computer compares API to RPI, and both API and RPI to the Group Avg. Deviations greater than the limits are flagged with ">>>>>". Bad signals are flagged as "B" and their deviations are flagged "****". Asymmetric rods, >6.5% are flagged "!!!!!" and the value will not be used in the Group Avg.
- A rod is considered inoperable if it can not be located with API, RPI or IN/OUT-LIMIT lights. Refer to TS 3.1.7.

19.1 IF desired to use plant computer,
THEN perform one of the following:

19.1.1 IF desired to use the NASP function,
THEN perform the following:

NOTE

If EC60523 is installed, then PI Panel POSITION SELECT switch is mounted on back of C74 in Computer Room.

A. Note position of PI Panel POSITION SELECT switch: ABSOL or REL.

B. On PMS, select NAS.

C. On PMS, select N4.

D. Depress “F4”

E. Depress 1 (CRD Position Report).

F. Depress “Enter” to print.

G. Depress “Enter” to select local printer.

H. Obtain printout.

I. Verify the following on printout:

- Correct time
- Correct date

J. Mark printout with appropriate position: ABSOL or REL.

K. Place PI Panel POSITION SELECT switch to opposite position: REL or ABSOL.

L. Depress “F4”

M. Depress 1 (CRD Position Report).

N. Depress “Enter” to print.

O. Depress “Enter” to select local printer.

P. Obtain printout.

Q. Mark printout with appropriate position: REL or ABSOL.

R. Verify PI Panel POSITION SELECT switch in ABSOL.

19.1.2 IF desired to use function hot key, THEN perform the following:

NOTE

If EC60523 is installed, then PI Panel POSITION SELECT switch is mounted on back of C74 in Computer Room.

A. Verify PI Panel POSITION SELECT switch in ABSOL.

B. Depress the API/RPI labeled hot key.

C. Depress “ENTER” to select each default value.

D. Enter PI Panel POSITION SELECT switch position.

E. Place PI Panel POSITION SELECT switch to REL.

F. Select “YES”.

G. Select F3 to print.

H. Obtain printout.

I. Verify the following on printout:

- Correct time
- Correct date

J. Verify PI Panel POSITION SELECT switch in ABSOL.

19.2 IF SPDS report desired,
THEN perform the following:

NOTE

If EC60523 is installed, then PI Panel POSITION SELECT switch is mounted on back of C74 in Computer Room.

19.2.1 Note position of PI Panel POSITION SELECT switch: ABSOL or REL.

19.2.2 Open a tabular trend.

19.2.3 Search for “Z1*”.

19.2.4 Depress the CONTROL key.

19.2.5 Select each of the control rods.

19.2.6 Click “SELECT”.

19.2.7 Print tabular trend.

A. Mark the report with appropriate position: ABSOL or REL.

B. Verify the following on printout:

- Correct time
- Correct date

19.2.8 Place PI Panel POSITION SELECT switch to opposite position: REL or ABSOL.

19.2.9 Print tabular trend.

A. Mark the report with appropriate position: REL or ABSOL.

B. Verify the following on printout:

- Correct time
- Correct date

19.2.10 Verify PI Panel POSITION SELECT switch in ABSOL.

Unit 1 2016 NRC Exam

Simulator JPM

S2

JOB PERFORMANCE MEASURE

Unit: 1 Rev # 9 Date: 8/4/2016

JPM ID: A1JPM-RO-ESAS1 (S2)

System/Duty Area: ENGINEERED SAFEGUARDS ACTUATION SYSTEM

Task: Verify Proper ESAS Actuation (and Perform ESAS Operation After Actuation)

JTA# ANO1-RO-ESAS-NORM-5

KA Value RO 4.5 SRO 4.8 KA Reference 013 A4.01

Approved For Administration To: RO X SRO X

Task Location: Inside CR: X Outside CR: ______ Both: ______

Suggested Testing Environment And Method (Perform or Simulate):

Plant Site: ______ Simulator: Perform Lab: ______

Position Evaluated: RO: ______ SRO: ______

Actual Testing Environment: Simulator : ______ Plant Site: ______ Lab: ______

Testing Method: Simulate: ______ Perform: ______

Approximate Completion Time In Minutes: 7 Minutes

Reference(s): 1202.012, RT-10, Verify proper ESAS actuation (Revision 16)

Examinee's Name: ______ ID: ______

Evaluator's Name: ______

The Examinee's performance was evaluated against the standards contained in this JPM and is determined to be:

Satisfactory: ______ Unsatisfactory: ______

Performance Checklist Comments:

______

______

______

Start Time ______ Stop Time ______ Total Time ______

*Signed ______ Date: ______

*Signature indicates this JPM has been compared to its applicable procedure by a qualified individual (not the examinee) and is current with that revision.

JPM ID: A1JPM-RO-ESAS1

THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:

The examiner shall ensure that the examinee has been briefed on the JPM Examination Briefing Sheet EN-TQ-114 Attachment 9.5 or NUREG 1021 Appendix E.

JPM INITIAL TASK CONDITIONS:

K11-F6, ESAS Partial Trip is in alarm and ESAS is imminent on low RCS pressure.
Reactor Coolant Pumps have been tripped due to LOSM.
CV-1206 (RCP Seal INJ Block) is open in OVRD.

TASK STANDARD:

HPI Pump P-36C must be secured
LPI Pump P-34B must be secured
HPI Block valve CV-1278 throttled back so that its flow is within ~20 gpm of the next highest HPI flow.

This is an alternate success path JPM.

TASK PERFORMANCE AIDS:

1202.012, RT-10, Verify proper ESAS actuation.

SUGGESTED SIMULATOR SETUP:

Use any at power IC.
IC 284

Align P-36C as the ES Pump and P-36A as OP HPI Pump.
IMF CV063 (C Makeup/HPI Pump Trip P-36C).
IMF CV1408 (CV-1408 fails to open on ESAS CH 2 and 4)
Place CV-1206 in override and verify open.
IMF RC462 2.5 (RCS leak downstream of MU45A) (RCS leak causes ESAS to actuate on low RCS pressure.
CV-1278 will have to be throttled back to within 20 gpm of the next highest HPI flow).
Trip all RCPs.
Verify that CV-1278 should be throttled per RT10.
Snapshot can now be made.

Revision 6 Note:
Added failure of CV-1408 to make the JPM have more than one critical step.
Updated for procedure revision.

JPM ID: A1JPM-RO-ESAS1

INITIATING CUE: The SM/CRS directs you to perform RT-10 (Verify proper ESAS actuation).

C	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
	1. Verify BWST Outlets open: • CV-1407 • CV-1408 POSITIVE / NEGATIVE CUE: **CV-1407 has red light ON, green light OFF. (Open)** **CV-1408 had green light ON, red light OFF. (Closed)**	On panel C16 recognized CV-1408 closed. On panel C18 verified CV-1407 open.	____	____	____
EXAMINER CUE: Tell the applicant he has permission to override and stop components. (**Note** – P-36C will trip in ~30 seconds so this communication must occur promptly)					
Alternate Path #1 Begins here.					
C	A. **IF** BWST T3 Outlet (CV-1407 or CV-1408) fails to open, **THEN** override **AND** stop associated HPI, LPI, and RB Spray pumps until failed valve is opened: POSITIVE CUE: **MAN switch backlit (White) on for HPI and LPI Pumps** **HPI and LPI pumps in override and stopped.**	On panel C16 Placed HPI Pump (P-36C) in override. Stopped HPI Pump (P-36C). Placed LPI Pump (P-34B) in override. Stopped LPI Pump (P-34B). RB Spray Pump (P-35B) does not have an actuation signal and is therefore N/A	____	____	____
Alternate Path #1 Ends here.					
	2. Verify service water to DG1 and DG2 coolers open: • CV-3806 • CV-3807 POSITIVE CUE: **Red lights ON, green lights OFF for CV-3806 and CV-3807.**	On panel C19, verified service water to DG1 and DG2 coolers open, CV-3806 and CV-3807.	____	____	____
EXAMINER NOTE: Step 3 of RT10 is N/A due to RCPs off.					
	3. IF any RCP is running, THEN perform the following: POSITIVE CUE: **All RCPs are off.**	N/A, all RCPs were secured due to LOSM.	____	____	____

C	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
<u>EXAMINER NOTE</u>: ES Channels 5 and 6 may actuate during the verification of Step 4, in which case the applicant may re-perform previous steps.					
	4. Verify proper ESAS channels tripped. <u>POSITIVE CUE:</u> **Channels 1, 2, 3 and 4 are tripped.**	Verified that ESAS Channels 1-4 are tripped by observing that annunciators K11-A2 (HPI Channel 1), K11-A3 (HPI Channel 2), K11-B2 (LPI Channel 3) and K11-B3 (LPI Channel 4) in alarm or by observing appropriate components have repositioned on C16 and C18.	____	____	____
	5. Perform the following: A. Verify each component properly actuated on C16 and C18, <u>except</u> those overridden in previous steps. B. Verify proper ES system flow rates. 1. IF any of the following conditions exist: • A HPI FLOW HI/LO (K11-A4) • B HPI FLOW HI/LO (K11-A5) • A LPI FLOW HI/LO (K11-B4) • B LPI FLOW HI/LO (K11-B4) • A RB SPRAY FLOW HI/LO (K11-C4) • B RB SPRAY FLOW HI/LO (K11-C5) <u>POSITIVE CUE</u>: **All ES components on C16 and C18 are in their proper position except P-34B and P-36C.**	On panels C16/18, verified each component in its proper ES position except that P-36C and P-34B are off.	____	____	____
<u>EXAMINER NOTE</u>: The only ES flows that are in service at this time will be HPI flow from the A HPI pump P-36A. RCS pressure is too high for LPI flow and RB Spray has not actuated. LPI flow low alarm cannot be corrected by ACA at current RCS pressure. HPI Low Flow for P-36C cannot be corrected due to the pump being secured in earlier step.					

C	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
<u>EXAMINER CUE</u>: Acknowledge that the applicant has ask permission to override and throttle closed on CV-1278					
<u>Alternate Path #2</u> Begins here.					
(C)	5. C. If only one train of HPI is available AND RCS press is > 600 psig, THEN throttle HPI Block valve with the highest flow to within 20 gpm of the next highest flow. <u>POSITIVE CUE</u>: **MAN switch backlit (White).** **All HPI flows from P-36A are within 20 gpm of each other.**	On panel C18, depressed MAN pushbutton associated with CV-1278. Throttled HPI block valve CV-1278 back so that its flow is within ~20 gpm of the next highest flow indicated on FIRS-1209 (on C18) or on SPDS HPI P-36A Diagnostic screen.	____	____	____
<u>Alternate Path #2</u> Ends here.					
<u>EXAMINER CUE</u>: Notify applicant that the JPM is complete after he balances flow per the standard above.					

<u>NOTES:</u> ____

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END

INITIAL CONDITIONS:

K11-F6, ESAS Partial Trip is in alarm and ESAS is imminent on low RCS pressure.
Reactor Coolant Pumps have been tripped due to LOSM.
CV-1206 (RCP Seal INJ Block) is open in OVRD.

INITIATING CUE:

The SM/CRS directs you to perform RT10, Verify proper ESAS actuation.

VERIFY PROPER ESAS ACTUATION

NOTE

Obtain Shift Manager/CRS permission prior to overriding ES.

1. **Verify BWST T3 Outlets open:**

- CV-1407
- CV-1408

A. **IF** BWST T3 Outlet (CV-1407 or CV-1408) fails to open,
THEN override **AND** stop associated HPI, LPI, and RB Spray pumps until failed valve is opened:

CV-1407	CV-1408
P34A	P34B
P36A/B	P36C/B
P35A	P35B

2. **Verify SERV WTR to DG1 and DG2 CLRs open:**

- CV-3806
- CV-3807

VERIFY PROPER ESAS ACTUATION

3. **IF any RCP is running,**
   THEN perform the following:

   A. **IF** ES Channel 5 or 6 has actuated,
      THEN perform the following:

      1) **IF** SCM is adequate,
         THEN trip all running RCPs due to loss of ICW:

         - P32A
         - P32B
         - P32C
         - P32D

      2) **IF** SCM is **not** adequate,
         THEN check elapsed time since loss of adequate SCM
         AND perform the following:

         a) **IF** ≤ 2 minutes have elapsed,
            THEN trip all RCPs:

            - P32A
            - P32B
            - P32C
            - P32D

         b) **IF** > 2 minutes have elapsed,
            THEN perform the following:

            (1) Leave currently running RCPs on.

            (2) **IF** RCS press > 150 psig,
                THEN notify CRS to **GO TO 1202.002, "LOSS OF SUBCOOLING MARGIN"** procedure.

            (3) Restore RCP services per RT-8 while continuing.

   B. **IF** neither ES channel 5 nor 6 has actuated,
      THEN dispatch an operator to perform Service Water And Auxiliary Cooling System (1104.029) Exhibit B, "Restoring SW to ICW Following ES Actuation" while continuing.

      1) **WHEN** ICW Cooler SW Outlets and Bypasses are aligned per 1104.029, Exhibit B,
         THEN override **AND** open one Service Water to ICW Coolers Supply
         (CV-3811 or CV-3820).

VERIFY PROPER ESAS ACTUATION

4. Verify proper ESAS Channels tripped:

Condition	Channels Actuated
RCS press ≤ 1550 psig	1,2,3,4
RB press ≥ 18.7 psia	1,2,3,4,5,6
RB press ≥ 44.7 psia	7,8,9,10

5. Perform the following:

A. Verify each component properly actuated on C16 and C18, **except** those overridden in previous steps.

B. Verify proper ES system flow rates.

NOTE

- During ESAS actuation, low LPI flow is expected until RCS depressurizes below LPI pump shutoff head.
- During large break LOCAs, high LPI flow can be experienced. Flow must be throttled to ensure ECCS flows are maintained within assumptions of calculations.

1. **IF** any of the following conditions exist:

   - A HPI FLOW HI/LO (K11-A4)
   - B HPI FLOW HI/LO (K11-A5)
   - A LPI FLOW HI/LO (K11-B4)

   - B LPI FLOW HI/LO (K11-B5)
   - A RB SPRAY FLOW HI (K11-C4)
   - B RB SPRAY FLOW HI (K11-C5)

   THEN use Annunciator K11 Corrective Action (1203.012J) to clear unexpected alarms.

C. **IF** only one train of HPI is available
AND
RCS press is > 600 psig,
THEN throttle HPI Block valve with the highest flow to within 20 gpm of the next highest flow.

VERIFY PROPER ESAS ACTUATION

6. On C10, perform the following:

- Verify DGs operating within normal limits:
  - DG 1
    - 4100 to 4200 V
    - 59.5 to 60.5 Hz
    - ≤ 2750 KW
  - DG 2
    - 4100 to 4200 V
    - 59.5 to 60.5 Hz
    - ≤ 2750 KW
- Verify the following breakers open:
  - A3-A4 Crossties:
    - A-310
    - A-410
  - B5-B6 Crossties:
    - B-513
    - B-613
  - Unit AUX feeds to A1 and A2:
    - A-112
    - A-212
- Verify the following breakers closed:
  - A3 Feeds to B5:
    - A-301
    - B-512
  - A4 Feeds to B6:
    - A-401
    - B-612

7. On C09, perform the following:

A. Check AUX Cooling Water header depressurized.

B. **<u>IF</u>** proper EFW actuation and control has **<u>not</u>** already been verified, **<u>THEN</u>** verify proper EFW actuation and control (RT-5).

VERIFY PROPER ESAS ACTUATION

8. On C19, perform the following:

A. Verify LPI (Decay Heat) Room Cooler running in each Decay Heat Room:

P34A Room	P34B Room
VUC1A or B	VUC1C or D

B. **IF** RB Spray has actuated,
THEN verify SW to RB Spray P35A and P35B LO CLRs open:

- CV-3804
- CV-3805

9. IF all RCPs are off
AND
RCP Seal INJ Block (CV-1206) is closed,
THEN place RCP Seal Bleedoff (Alternate Path to Quench Tank) controls in CLOSE:

- SV-1271
- SV-1273
- SV-1270
- SV-1272

10. IF leakage into the RB is indicated,
THEN verify RB cooling maximized:

A. Verify all four RB Cooling Fans running:

- VSF1A
- VSF1C
- VSF1B
- VSF1D

B. Verify RB Cooling Coils Service Water Inlet/Outlet valves open:

- CV-3812/CV-3814
- CV-3813/CV-3815

C. Verify key-locked Chiller Bypass Dampers unlatched:

- SV-7410
- SV-7412
- SV-7411
- SV-7413

VERIFY PROPER ESAS ACTUATION

11. Initiate RB H_2 sampling using Containment Hydrogen Control (1104.031), Exhibit A.

12. Verify each component properly actuated on C26.

13. Verify the following sample valves closed on C26:

- Pressurizer Steam Space Sample Valve (CV-1814)
- Pressurizer Water Space Sample Valve (CV-1816)
- Hot Leg Sample (SV-1840)

14. Verify the following High Point Vents closed:

A Loop	B Loop	Reactor Vessel	Pressurizer
• SV-1081	• SV-1091	• SV-1071	
• SV-1082	• SV-1092	• SV-1072	• SV-1077
• SV-1083	• SV-1093	• SV-1073	• SV-1079
• SV-1084	• SV-1094	• SV-1074	

15. <u>IF</u> AUX Lube Oil pump for running HPI pump fails to stop after 20 second time delay, <u>THEN</u> within one hour of ESAS actuation dispatch an operator to stop AUX Lube Oil pump locally at breaker while continuing:

P64A	P64B	P64C
B5721	B5722/B6515	B6514

16. Place running Low Pressure Injection (Decay Heat) Pump (P34A/P34B) hand switches in NORMAL-AFTER-START to enable DECAY HEAT PUMP TRIP (K09-A7) alarm:

- P34A
- P34B

17. Monitor ENGINEERED SAFEGUARDS ACTUATION SYSTEM alarms on K11.

VERIFY PROPER ESAS ACTUATION

18. **<u>IF</u> any of the following components/systems are in service:**

    - **Condensate Pumps**
    - **Condenser Vacuum Pumps**
    - **Waterbox Vacuum Pumps**
    - **Seal Oil System**
    - **Control Room Chillers**

    <u>THEN</u> coordinate with CRS/SM to secure components and/or systems, as time permits.

19. **Coordinate with CRS/SM to re-verify component actuation with another operator.**

END

Unit 1 2016 NRC Exam

Simulator JPM

S3

JOB PERFORMANCE MEASURE

Unit: 1 Rev # 6 Date: 8/4/2016

JPM ID: A1JPM-RO-PZR02 (S3)

System/Duty Area: Pressurizer Pressure Control System

Task: Respond to Pressurizer Spray Valve Failure

JTA# ANO1-RO-AOP-OFFNORM-115, ANO1-SRO-AOP-OFFNORM-114

KA Value RO 3.9 SRO 3.9 KA Reference: 010 A2.02

Approved For Administration To: RO X SRO X

Task Location: Inside CR X Outside CR ______ Both ______

Suggested Testing Environment and Method (Perform or Simulate):

Plant Site: ______ Simulator: Perform Lab: ______

Position Evaluated: RO: ______ SRO: ______

Actual Testing Environment: Plant Site ______ Simulator ______ Lab ______

Testing Method: Perform ______ Simulate ______

Approximate Completion Time in Minutes: 10 Minutes

Reference(s): 1103.005 PZR Operation (Section 8.2, Rev 45), 1203.015 PZR Systems Failure (Section 6, Rev 21)

Examinee's Name: ______ ID: ______

Evaluator's Name: ______

The Examinee's performance was evaluated against the standards contained in this JPM and is determined to be:

Satisfactory: ______ Unsatisfactory: ______

Performance Checklist Comments:

______

______

______

Start Time ______ Stop Time ______ Total Time ______

*Signed ______ Date ______

*Signature indicates this JPM has been compared to its applicable procedure by a qualified individual (not the examinee) and is current with that revision.

JPM ID: A1JPM-RO-PZR02

THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:

The examiner shall ensure that the examinee has been briefed on the JPM Examination Briefing Sheet EN-TQ-114 Attachment 9.5 or NUREG 1021 Appendix E.

JPM INITIAL TASK CONDITIONS:

- The plant is at steady state power operations with no load transients anticipated.
- Chemistry reports a Pressurizer Boron sample 60 ppm higher than RCS Boron (this has been confirmed with a backup sample).
- An SRO has verified that the full reactivity effect of the equalization will be a boration of 5 ppm.
- The RCS has been diluted to achieve ~275% rod index.
- You are responsible for panel C04 and related annunciators.

TASK STANDARD:

Performed the following in accordance with the applicable procedures without causing a Reactor Trip.

- Pressurizer boron equalization started per 1103.005
- CV-1009 (Pressurizer Spray Isolation Valve) closed per 1203.015

TASK PERFORMANCE AIDS:

1103.005 Section 8.2 and 1203.015 Section 6

This JPM is an Alternate Success Path JPM.

SIMULATOR SETUP:

100% power with rod index at ~275%. (IC 280)
Close RC4 Pressurizer spray minimum flow.
When CV-1008 is cracked open, insert command to fail Pressurizer Spray Valve CV-1008 to full open.

JPM ID: A1JPM-RO-PZR02

INITIATING CUE:

The CRS/SM directs you to equalize Pressurizer and RCS boron concentrations per 1103.005 Pressurizer Operation beginning at step 8.2.6.

C	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
(C)	8.2.6 Place Pressurizer Spray Valve (CV-1008) in manual and open slightly while maintaining target pressure band 2130 to 2180 psig. **<u>POSITIVE CUE</u>:** **CV-1008 is in manual and throttled open.**	On panel C04, placed HS-1003 in Manual position and placed CV-1008 in throttled open position.	_____	_____	___
	8.2.7 To maximize PZR recirc flow and minimize RCS pressure fluctuations, perform the following: A. Operate PZR heaters in MANUAL as needed. B. Maintain below applicable 480V bus current limits. **<u>POSITIVE CUE</u>:** **PZR heater banks are in manual and 480V bus currents within limits**	Placed some PZR heaters in manual (SAT if examinee places any of the heaters in manual).	_____	_____	___
<u>EXAMINER NOTE</u>: Fail CV-1008 100% open (wait until Step 8.2.7 has been done.)					
<u>BOOTH:</u> Insert malfunction to fail CV-1008 full open.					
ALTERNATE PATH BEGINS HERE					
(C)	8.2.8 Throttle spray flow to hold steady pressure while maintaining target pressure band 2130 to 2180 psig. **<u>FAULTED CUE</u>:** **RCS pressure is dropping and CV-1008 is full open.**	Monitored RCS pressure, noticed RCS pressure dropping and/or Pressurizer Spray Valve CV-1008 full open.	_____	_____	___

JPM ID: A1JPM-RO-PZR02

INITIATING CUE:

C	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
	8.2.9 IF any upset occurs while equalizing boron, THEN GO TO step 8.2.13. **POSITIVE CUE:** **Applicant transitions to Step 8.2.13.**	Applicant transitions to Step 8.2.13	____	____	___
	8.2.13 WHEN boron differential is ≤ 50 ppm, OR an upset occurs while equalizing, THEN verify controls in AUTO, or ON as follows: • Pressurizer Spray Control AUTO • Bank 1 Proportional Heaters AUTO • Bank 2 Proportional Heaters AUTO • Bank 4 Heaters AUTO • Bank 3 Heaters AUTO • Bank 5 Heaters AUTO • Group 5 Heaters ON A. IF an upset occurred that exceeded Tech Spec 3.4.1 minimum steady state RCS pressure limits, THEN initiate a condition report. NEGATIVE CUE: **CV-1008 will not close (red light ON, green light OFF).** **Pressurizer heaters are in automatic**	May attempt to close Pressurizer Spray Valve CV-1008. Place CV-1008 to AUTO to see if valve will close. Return pressurizer heaters to AUTO.	____	____	___

JPM ID: A1JPM-RO-PZR02

INITIATING CUE:

C	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
EXAMINER NOTE: Expect RCS Pressure Lo alarm. The following steps are from the ACA for K09-C1.					
	1. Confirm alarm by comparing RC pressure indications on C04. • RC Pressure Narrow Range Loop A recorder (PR-1023) • RC Pressure Narrow Range Loop B recorder (PR-1038) • RC Pressure Wide Range Loop B recorder (PI-1041) • RC Pressure Wide Range Loop B indicator (PR-1042) **POSITIVE CUE:** **RCS Pressure is less than 2055 psig and lowering**	Applicant verifies alarm is valid by checking RCS pressure less than 2055 psig	____	____	___
	2. Refer to COLR Figures for RC pressure limits. **POSITIVE CUE:** **CRS acknowledges need to reference COLR Figures.**	Applicant informs CRS of need to reference COLR Figures or actually refers to the COLR.	____	____	___
	3. IF RC pressure is confirmed low, THEN perform the following: A. Verify all pressurizer heaters on. B. Verify Pressurizer Spray (CV-1008) closed. C. Verify ERV (PSV-1000) closed. D. Refer to Pressurizer Systems Failure (1203.015). **POSITIVE CUE:** **All appropriate heaters are energized** **CV-1008 is OPEN** **PSV-1000 is closed** **Refers to 1203.015**	Applicant refers to Pressurizer Systems Failure OP-1203.015 and / or takes appropriate actions from the AOP.	____	____	___
EXAMINER NOTE: The applicant may not reference the ACA, but proceed directly to the 1203.015 AOP, or may take prudent action and close the Spray Isolation Valve prior to referencing either procedure.					

JPM ID: A1JPM-RO-PZR02

INITIATING CUE:

C	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
EXAMINERE NOTE: Applicant will transition to 1203.015, Pressurizer System Failures, Section 6. Step 1 attempts to close the Pressurizer Spray Valve CV-1008 in manual, which was already attempted previously. (Step 1.A is below)					
EXAMINER CUE: If asked the CRS does NOT desire to torque CV-1009 closed.					
C	A. **IF** CV-1008 will **not** close, **THEN** close Pressurizer Spray Isolation Valve (CV-1009). 1) **IF** CRS/SM desires, **THEN** override CV-1009 torque switch by holding the handswitch in the desired position. **POSITIVE CUE:** **CV-1009 is closed (green light indication ON, red light OFF). Pressure is recovering** NEGATIVE CUE: RCS pressure is 2000 psig and lowering.	On panel C04, closed Pressurizer Spray Isolation Valve CV-1009.	____	____	____
ALTERNATE PATH ENDS HERE					

END

JPM ID: A1JPM-RO-PZR02

INITIAL CONDITIONS:

- **The plant is at steady state power operations with no load transients anticipated.**
- **Chemistry reports a Pressurizer Boron sample 60 ppm higher than RCS Boron (this has been confirmed with a backup sample).**
- **An SRO has verified that the full reactivity effect of the equalization will be a boration of 5 ppm.**
- **The RCS has been diluted to achieve ~275% rod index.**
- **Reactivity Management Brief has been completed per COPD-030.**
- **You are responsible for panel C04 and related annunciators.**

INITIATING CUE:

- **The CRS/SM directs you to equalize Pressurizer and RCS boron concentrations per 1103.005 Pressurizer Operation beginning at step 8.2.6.**

R A P

CAUTION

The following section has been determined to have a Reactivity Addition Potential (RAP) and this activity is classified as a Risk Level R2.

8.0 Normal Operation

NOTE

ERV and code safety leakage may be detected by pressurizer relief valve monitoring system (See Pressurizer Relief Valve Monitoring System (1105.013)) or by observing the following downstream temperature elements:

Valve	Element	SPDS Point
PSV-1000	TE-1025	T1025
PSV-1001	TE-1026	T1026
PSV-1002	TE-1027	T1027

8.1 Observe that pressurizer heaters cycle at proper setpoints as listed in the "Setpoints" section of this procedure.

NOTE

- From 220" PZR level, assuming boron will be completely equalized, RCS concentration change is estimated by dividing the difference between PZR and RCS concentrations by a factor of 12. Examples:

  (PZR conc – RCS conc) / 12 = RCS concentration change

  (700 - 640) / 12 = 5 causing a 5 ppm boration

  (300 – 324) / 12 = -2 causing a 2 ppm dilution

- For a given spray flow, the greater the difference between PZR and RCS boron, the greater the rate of change in reactivity effects.
- During steady state power operations, it is desirable to equalize boron before 50 ppm difference is reached in order to lessen reactivity effects of the evolution.

8.2 WHEN PZR water space sampling indicates a difference of >50 ppm boron concentration between reactor coolant and PZR,
OR when directed by the CRS/SM
AND the following conditions are present:

- Unit at stable conditions
- No load transients anticipated,

THEN equalize concentrations as follows:

8.2.1 Using formula above, estimate full reactivity effect from boron equalization:

(circle one) boration / dilution of ________ ppm

A. Obtain SRO review of calculation.

8.2.2 IF equalization will cause a boration,
THEN consider diluting the RCS to obtain a rod index near the lower end of the CRD operating band prior to continuing.

8.2.3 IF a Reactivity Management Brief has NOT been conducted,
THEN perform a Reactivity Management Brief per COPD-030 with an SRO.

8.2.4 IF equalization will cause a dilution,
THEN verify power ≤99.75%.

NOTE

- The Tech Spec 3.4.1 minimum steady state RCS pressure limits are as follows (Ref. COLR):
  - 4-RCP minimum limit: 2082.2 psig
  - 3-RCP minimum limit: 2120.4 psig in the 1-pump loop
    2081.2 psig in the 2-pump loop
- COLR assumes these indications from PMS are used (or their equivalent):

Loop A	Loop B
P1021, P1023	P1038, P1039

8.2.5 Setup PMS trend for the following points if available:

- Reactor Coolant Pressure Loop A (P1021)
- Reactor Coolant Pressure Loop A (P1023)
- Reactor Coolant Pressure Loop B (P1038)
- Reactor Coolant Pressure Loop B (P1039)

A. Setup a programmable alarm on at least one of the above points.

8.2.6 Place Pressurizer Spray Valve (CV-1008) in manual and open slightly while maintaining target pressure band 2130 to 2180 psig.

8.2.7 To maximize PZR recirc flow and minimize RCS pressure fluctuations, perform the following:

A. Operate PZR heaters in MANUAL as needed.

B. Maintain below applicable 480V bus current limits.

8.2.8 Throttle spray flow to hold steady pressure while maintaining target pressure band 2130 to 2180 psig.

8.2.9 IF any upset occurs while equalizing boron, THEN GO TO step 8.2.13.

8.2.10 Monitor RCS pressure closely.

8.2.11 Verify PZR heaters remaining in AUTO cycle on and off as necessary to control RCS pressure.

8.2.12 Request chemist sample PZR boron periodically per Reactor Coolant System Sampling (1607.001).

8.2.13 WHEN boron differential is ≤ 50 ppm,
OR an upset occurs while equalizing,
THEN verify controls in AUTO, or ON as follows:

- Pressurizer Spray Control AUTO
- Bank 1 Proportional Heaters AUTO
- Bank 2 Proportional Heaters AUTO
- Bank 4 Heaters AUTO
- Bank 3 Heaters AUTO
- Bank 5 Heaters AUTO
- Group 5 Heaters ON

A. IF an upset occurred that exceeded Tech Spec 3.4.1 minimum steady state RCS pressure limits,
THEN initiate a condition report.

9.0 Depressurization

9.1 For RCS cooldown to ≤ 280°F:

9.1.1 IF RC pumps are in service,
THEN refer to Plant Shutdown and Cooldown (1102.010).

9.1.2 IF RC pumps are off,
THEN refer to Natural Circulation Cooldown (1203.013).

9.2 For decay heat operation ≤ 280°F to Mode 5, use PZR auxiliary spray (CV-1416) as necessary to reduce RCS pressure per Decay Heat Removal Operating Procedure (1104.004).

9.3 To collapse PZR steam bubble, refer to one of the following procedures:

- Decay Heat Removal Operating procedure (1104.004), "Maintaining RCS Pressure with N_2 While Collapsing the Pressurizer Steam Bubble" section.
- Draining and N_2 Blanketing the RCS (1103.011), "Collapsing the Pressurizer Steam Bubble" section.
- Draining and N_2 Blanketing the RCS (1103.011), Attachment G "Scripted RCS Drain from Bubble in Pressurizer to Cold Legs Drained" (this section assumes RCS Alternate Purification is in service).

9.4 Refer to Draining and N_2 Blanketing the RCS (1103.011) to de-energize and danger tag pressurizer heaters when draining the pressurizer.

SECTION 6 -- PRESSURIZER SPRAY VALVE (CV-1008) FAILURE
ENTRY CONDITIONS

One or more of the following:

- CV-1008 closed when it should be open.
  - Normal operation: Opens - 2205 psig
    Closes - 2155 psig
  - Power >80% and MFP trip: Opens - 2080 psig
    Closes - 2030 psig
- CV-1008 open when it should be closed.
- Abnormal change in RC pressure.
- RCS pressure transmitter failure which is selected for RCS pressure control.

SECTION 6 -- PRESSURIZER SPRAY VALVE (CV-1008) FAILURE
INSTRUCTIONS

1. **IF Pressurizer Spray Valve (CV-1008) is failed open,**
THEN place Pressurizer Spray Control Mode switch (HS-1003) in MAN AND attempt to close CV-1008 (modulating valve).

   A. **IF** CV-1008 will **not** close,
   THEN close Pressurizer Spray Isolation Valve (CV-1009).

      1) **IF** CRS/SM desires,
      THEN override CV-1009 torque switch by holding the handswitch in the desired position.

      2) **IF** CV-1009 will **not** close
      AND if time permits,
      THEN perform the following:

         a. Dispatch an operator to Pressurizer Spray Block CV-1009 (B5534).

         b. Attempt to close CV-1009 using local handswitch on breaker.

   B. Verify Pressurizer heaters return RCS pressure to normal.

> **CAUTION**
> Pressurizer spray shall not be used if the temperature difference between the Pressurizer and the spray fluid is >430°F (TRM 3.4.3). Closing CV-1009 isolates the CV-1008 bypass spray flow.

   C. **IF** necessary,
   THEN cycle Pressurizer Spray Isolation Valve (CV-1009) open and closed to control RCS pressure and spray line temperature..

   D. **IF** both CV-1008 and CV-1009 fail to close
   AND RCS pressure is dropping,
   THEN perform the following:

      1) Verify all PZR heaters ON.

      2) Immediately begin reducing load to 40% at 10%/min per Rapid Plant Shutdown (1203.045).

(continued)

SECTION 6 -- PRESSURIZER SPRAY VALVE (CV-1008) FAILURE

3) **IF** 4 RCPs are running
AND BOTH of the following conditions are met:

- Load is reduced to ≤675 MWe (≤75% load)
- Reactor power is ≤75%,

THEN perform the following:

a) Start one of the following:

- "C" RCP HP Oil Lift Pump (P-63C)
- “C” Emergency HP Oil Lift Pump (P-80C)

b) Place the pump **not** started in Pull-to-Lock:

- "C" RCP HP Oil Lift Pump (P-63C)
- “C” Emergency HP Oil Lift Pump (P-80C)

c) Start both of the following:

- "C" RCP Backstop Lube Oil Pump (P-81C)
- “C” Backup Backstop Lube Oil Pump (P-82C)

d) Stop "C" RCP (P-32C).

e) **WHEN** zero speed is indicated,
THEN verify the following pumps in PULL-TO-LOCK:

- P-63C
- P-80C
- P-81C
- P-82C

(continued)

SECTION 6 -- PRESSURIZER SPRAY VALVE (CV-1008) FAILURE

NOTE

In Modes 1 and 2, operation with only one RCP in each loop causes entry into TS 3.4.4 Condition A.

4) **IF** 3 RCPs running
AND all of the following conditions are met:

- Load is reduced to ≤360 MWe (≤40% load)
- Reactor power is ≤55%,
- "C" and "D" RCPs in-service

THEN perform the following:

a) Start one of the following:

- "C" RCP HP Oil Lift Pump (P-63C)
- "C" Emergency HP Oil Lift Pump (P-80C)

b) Place the pump **not** started in Pull-to-Lock:

- "C" RCP HP Oil Lift Pump (P-63C)
- "C" Emergency HP Oil Lift Pump (P-80C)

c) Start both of the following:

- "C" RCP Backstop Lube Oil Pump (P-81C)
- "C" Backup Backstop Lube Oil Pump (P-82C)

d) Stop "C" RCP (P-32C).

e) **WHEN** zero speed is indicated,
THEN verify the following pumps in PULL-TO-LOCK:

- P-63C
- P-80C
- P-81C
- P-82C

f) Enter TS 3.4.4 Condition A.

(continued)

SECTION 6 -- PRESSURIZER SPRAY VALVE (CV-1008) FAILURE

5) **IF** 3 RCPs running,
AND "D" RCP is secured,
THEN perform the following:

a) Trip Reactor.

b) Secure P-32C as follows:

1) Start one of the following:

- "C" RCP HP Oil Lift Pump (P-63C)
- “C” Emergency HP Oil Lift Pump (P-80C)

2) Place the pump **not** started in Pull-to-Lock:

- "C" RCP HP Oil Lift Pump (P-63C)
- “C” Emergency HP Oil Lift Pump (P-80C)

3) Start both of the following:

- "C" RCP Backstop Lube Oil Pump (P-81C)
- “C” Backup Backstop Lube Oil Pump (P-82C)

4) Stop "C" RCP (P-32C).

5) **WHEN** zero speed is indicated,
THEN verify the following pumps in PULL-TO-LOCK:

- P-63C
- P-80C
- P-81C
- P-82C

c) Perform Reactor Trip (1202.001) while continuing with this procedure.

d) Enter TS 3.4.5 Condition A.

6) **WHEN** conditions permit a Reactor Building entry,
THEN attempt to manually close either CV-1008 or CV-1009.

E. Contact Senior Manager, Operations.

(continued)

SECTION 6 -- PRESSURIZER SPRAY VALVE (CV-1008) FAILURE

2. IF Pressurizer Spray Valve (CV-1008) is failed closed,
THEN perform the following:

A. Hold the plant at steady state conditions.

B. **IF** CV-1008 is energized,
THEN place Pressurizer Spray Control Mode switch (HS-1003) in MAN AND attempt to cycle CV-1008 (modulating valve) open and closed.

C. Write a Condition Report to evaluate continued operation of the plant with inoperable Spray Valve.

D. Contact Senior Manager, Operations AND consider one or both of the following:

1) **IF** CV-1008 will **not** open,
THEN commence a shutdown per Power Reduction and Plant Shutdown (1102.016) and Plant Shutdown and Cooldown (1102.010).

a. During shutdown, perform the following:

- To prevent lifting of relief valves, reduce power slowly.
- Regulate RCS pressure by manual control of Pressurizer heaters.

2) **WHEN** conditions permit a reactor building entry,
THEN perform the following:

a. Close Pressurizer Spray Isolation Valve (CV-1009) from C04.

b. Attempt to manually open CV-1008 in reactor building.

CAUTION

Pressurizer spray shall not be used if the temperature difference between the Pressurizer and the spray fluid is >430°F (TRM 3.4.3). Closing CV-1009 isolates the CV-1008 bypass spray flow.

c. **IF** CV-1008 can be opened,
THEN cycle CV-1009 open and closed to control RCS pressure and spray line temperature.

3. IF an RCS pressure transmitter which is selected for control has failed or is failing,
THEN GO TO Annunciator K07 Corrective Action (1203.012F), SASS Mismatch (K07-B4).

4. Refer to "RCS Pressure, Temperature and Flow DNB Surveillance Limits" of the ANO1 COLR (TS 3.4.1).

END

Unit 1 2016 NRC Exam

Simulator JPM

S4

JOB PERFORMANCE MEASURE

Unit: 1 Rev # 5 Date: 8/4/2016

JPM ID: ANO-1-JPM-RO-RCP04 (S4)

System/Duty Area: REACTOR COOLANT PUMP SYSTEM

Task: SHUTDOWN RCP P-32A AT POWER

JTA# ANO1-RO-RCP-NORM-3

KA Value RO 3.7 SRO 3.9 KA Reference: 003 A2.02

Approved For Administration To: RO X SRO X

Task Location: Inside CR X Outside CR ___ Both ___

Suggested Testing Environment and Method (Perform or Simulate):

Plant Site: ___ Simulator: Perform Lab: ___

Position Evaluated: RO: ___ SRO: ___

Actual Testing Environment: Plant Site ___ Simulator ___ Lab ___

Testing Method: Perform ___ Simulate ___

Approximate Completion Time in Minutes: 5 Minutes

Reference(s): OP-1103.006 Rev. 44 and OP-1203.031 Rev. 26

Examinee's Name: ___ ID: ___

Evaluator's Name: ___

The Examinee's performance was evaluated against the standards contained in this JPM and is determined to be:

Satisfactory: ___ Unsatisfactory: ___

Performance Checklist Comments:

Start Time ___ Stop Time ___ Total Time ___

*Signed ___ Date ___

*Signature indicates this JPM has been compared to its applicable procedure by a qualified individual (not the examinee) and is current with that revision.

JPM ID: ANO-1-JPM-RO-RCP04

THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:

The examiner shall ensure that the examinee has been briefed on the JPM Examination Briefing Sheet EN-TQ-114 Attachment 9.5 or NUREG 1021 Appendix E.

JPM INITIAL TASK CONDITIONS:

Unit 1 is at 59% power.
Reactivity Management Brief was conducted prior to the down power.
It is not desired to have predictive maintenance install backup indication of RCP zero speed.

TASK STANDARD:

The Applicant secured P-32A RCP in accordance with OP-1103.006 Section 10.0, recognized reverse pump rotation, and tripped the reactor and all other running RCPs.

TASK PERFORMANCE AIDS:

OP-1103.006, REACTOR COOLANT PUMP OPERATION, Rev. 44, Section 10.0
OP-1203.031, REACTOR COOLANT PUMP AND MOTOR EMERGENCY, Rev. 26, Section 6

This JPM is an Alternate Success Path JPM.

INITIATING CUE:
CRS directs you to secure P-32A RCP per OP-1103.006 Section 10.0 starting at Step10.5.

Suggested simulator setup:
59% power (IC 280)
Malfunction – IMF RC466 – Reverse Rotation for P-32A
Override – DO HS1022_B;false (Prevents zero speed lamp for P-32A from coming on)
15 seconds after pump stop insert the following for vibrations:
IOR-DO K08B6 True – RCP VIB HI alarm
IOR-DORCPA_R01 True – RCP VIB HI red light

Revision 2 notes: Updated for procedure revisions.

JPM ID: ANO-1-JPM-RO-RCP04

INITIATING CUE: CRS directs you to secure P-32A RCP per OP-1103.006 Section 10.0 starting at Step10.5.

<table>
<tr><th>(C)</th><th>PERFORMANCE CHECKLIST</th><th>STANDARD</th><th>SAT</th><th>UN SAT</th><th>N/A</th></tr>
<tr><td colspan="6">EXAMINER CUE: If asked inform applicant that Step 10.3 is NOT desired, i.e. predictive maintenance will not be asked to install backup indication of RCP zero speed prior to RCP stop.</td></tr>
<tr><td></td><td>10.5.1 IF stopping Reactor Coolant Pump (P-32A), THEN perform the following:

A. Start one of the following:
• HP Oil Lift Pump (P-63A)
• Emergency HP Oil Lift Pump (P-80A)
1. Place pump NOT started in PULL-TO-LOCK
• HP Oil Lift Pump (P-63A)
• Emergency HP Oil Lift Pump (P-80A)

POSITIVE CUE:
Red light ON and Green light OFF for selected pump to start.
Pump not started in PULL-TO-LOCK.</td><td>Applicant will start either
• HP Oil Lift Pump (P-63A)
• Emergency HP Oil Lift Pump (P-80A)
Applicant will place other pump in PULL-TO-LOCK.
• HP Oil Lift Pump (P-63A)
• Emergency HP Oil Lift Pump (P-80A)</td><td>____</td><td>____</td><td>___</td></tr>
<tr><td colspan="6">EXAMINER NOTE: Applicant will verify lube oil pumps started correctly by checking flow switches on plant computer.</td></tr>
<tr><td></td><td>B. Start Backup Backstop Lube Oil Pump (P-82A).

POSITIVE CUE:
Red light ON and Green light OFF for P-82A</td><td>Applicant started Backup Backstop Lube Oil Pump (P-82A).</td><td>____</td><td>____</td><td>___</td></tr>
<tr><td></td><td>C. IF NOT running, THEN start Backstop Lube Oil Pump (P-81A).

POSITIVE CUE:
Red light ON and Green light OFF for P-81A</td><td>Applicant verifies Backstop Lube Oil Pump (P-81A) running.</td><td>____</td><td>____</td><td>___</td></tr>
</table>

JPM ID: ANO-1-JPM-RO-RCP04

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
(c)	D. Stop Reactor Coolant Pump (P-32A). **<u>POSITIVE CUE:</u>** **Green light ON and Red light OFF for P-32A**	Applicant stops P-32A Reactor Coolant Pump.	_____	_____	___
	E. IF only one RCP remains running, THEN stop the remaining RCP within 2 minutes **<u>POSITIVE CUE:</u>** **P-32A is the only pump to be stopped, the other three are running.**	Not Applicable.	_____	_____	___
	Steps 10.5.2 through 10.5.4 are not applicable				
<u>EXAMINER NOTE</u>: Applicant may begin monitoring for reverse rotation at this point and if identified may proceed as directed by AOP 1203.031 which would have him trip the reactor and stop all RCPs OR he may continue with the normal operating procedure which will accomplish these same steps. The following JPM steps assume he stays in OP-1103.006. If he transitions to the AOP, Step 6 will not be checked.					
	10.6 Perform the following during RCP coast down. 10.6.1 IF Reactor Coolant Pump (P-32A) stopped, THEN verify the following pumps remain on: • EITHER HP Oil Lift Pump (P-63A) OR Emergency HP Oil Lift Pump (P-80A) • Backstop Lube Oil Pump (P-81A) **<u>POSITIVE CUE:</u>** **Red light ON and Green light OFF for the two pumps previously started.** **Green light ON and Red light OFF for the pump in PULL-TO-LOCK**	Applicant verified appropriate pumps running. • HP Oil Lift Pump (P-63A) OR Emergency HP Oil Lift Pump (P-80A) • Backstop Lube Oil Pump (P-81A)	_____	_____	___

JPM ID: ANO-1-JPM-RO-RCP04

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
(C)	10.7.1 Perform the following to check no reverse rotation when the shaft stops: • IF associated RCS loop flow is no longer dropping, THEN consider the shaft stopped. • Plant computer reverse rotation alarm remains clear. o RCP P32A REVERSE ROTATION (FS6510) **<u>NEGATIVE CUE:</u>** **RCS loop flow is no longer dropping <u>BUT</u> plant computer reverse rotation is in alarm. RCP P32A REVERSE ROTATION (FS6510).**	Applicant recognizes that plant computer reverse rotation is in alarm. • RCP P32A REVERSE ROTATION (FS6510)	____	____	___

<u>EXAMINER NOTE</u>: Step below is the same in both OP-1203.031 Section 6, RCP Reverse Rotation and OP-1103.006 Step 10.8.
Only the Reactor Trip and tripping all RCPs are critical, the turbine will trip automatically and SCM will remain adequate with no operator actions.

ALTERNATE PATH BEGINS HERE

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
(C)	10.8 IF reverse rotation indicated, THEN perform the following: • Trip the reactor and perform immediate actions of Reactor Trip (1202.001) o Depress Reactor Trip PB, verify all rods inserted and reactor power dropping o Depress Turbine Trip PB, check Turbine throttle and governor valves closed o Check adequate SCM • Trip running RCP(s) • Refer to Emergency Operating Procedure (1202.XXX series) **<u>POSITIVE CUE:</u>** **Applicant will perform the following:** **Trip the reactor and perform immediate actions of Reactor Trip (1202.001)** o **Depress Reactor Trip PB, verify all rods inserted and reactor power dropping** o **Depress Turbine Trip PB, check Turbine throttle and governor valves closed**	Applicant will perform the following: Trip the reactor and perform immediate actions of Reactor Trip (1202.001) o Depress Reactor Trip PB, verify all rods inserted and reactor power dropping o Depress Turbine Trip PB, check Turbine throttle and governor valves closed o Check adequate SCM Trip running RCP(s) Refer to Emergency Operating Procedure (1202.001 Reactor Trip)	____	____	___

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
	o **Check adequate SCM** **Trip running RCP(s)** o **Green light ON and Red light OFF for all RCPs.** **Refer to Emergency Operating Procedure (1202.001 Reactor Trip)** o **Applicant may state that immediate actions are complete and that he would continue through the Reactor Trip EOP.**				
ALTERNATE PATH ENDS HERE					
EXAMINER CUE: Inform applicant JPM is complete.					

END

The following is the guidance contained in 1203.031, Reactor Coolant Pump and Motor Emergency AOP. This is not part of the included handout; it is only intended as a reference for the EXAMINER. These steps are included in the normal operating procedure (Step 10.8) that the applicant has already been given.

SECTION 6
RCP REVERSE ROTATION

INSTRUCTIONS

1. **Trip reactor AND perform immediate actions of Reactor Trip (1202.001).**
2. **Trip running RCP(s).**
3. **Refer to Emergency Operating Procedure (1202.XXX).**

END

JPM ID: ANO-1-JPM-RO-RCP04

INITIAL CONDITIONS:

Unit 1 is at 59% power.
Reactivity Management Brief was conducted prior to the down power.
It is not desired to have predictive maintenance install backup indication of RCP zero speed.

INITIATING CUE:

CRS directs you to secure P-32A Reactor Coolant Pump per OP-1103.006 Section 10.0 starting at Step10.5.
(Steps 10.1 through 10.4 have been completed as appropriate)

10.0 RCP Stop

10.1 IF RCP is tripped
OR emergency manual trip is required,
THEN refer to Reactor Coolant Pump Trip (1203.022).

CAUTION

R A P

The following section has been determined to have a Reactivity Addition Potential (RAP) and this activity is classified as a Risk Level R2.

10.2 IF a Reactivity Management Brief has NOT been conducted
AND reactor is critical,
THEN perform a Reactivity Management Brief per COPD-030 with an SRO.

10.3 IF desired
OR due to RCP monitoring equipment failure,
THEN contact predictive maintenance to install backup indication of RCP zero speed prior to RCP stop.

{4.3.1}

CAUTION

- **Stopping or shifting RCPs or changing RCP loop configuration when RPS is reset can cause a reactor trip or an ICS runback.**
- **Stopping the last RCP prior to bypassing EFIC will cause EFW actuation.**

10.4 IF RPS is reset and NOT in Shutdown Bypass,
THEN perform the following:

- Maintain 1 RCP per loop.
- Notify load dispatcher of any load change.
- IF stopping 1 of 4 RCPs,
  THEN reduce power to ≤70% using Rapid Plant Shutdown (1203.045) OR Power Reduction and Plant Shutdown (1102.016).

CAUTION

Operation with only 1 RCP in each loop is permitted for 18 hours with the Rx Critical per TS 3.4.4 Condition A. Mode 3 is required within an additional 6 hours per TS 3.4.4 Condition B.

CRITICAL STEP

- IF stopping 1 of 3 RCPs, resulting in 1 pump per loop,
  THEN reduce power to ≤40% using Rapid Plant Shutdown (1203.045) OR Power Reduction and Plant Shutdown (1102.016).

CAUTION

Single pump operation in excess of 2 minutes may cause pump damage due to inadequate flow through the hydrostatic bearing.

NOTE

Computer alarm BACKSTOP LO FLOW will not clear until both backstop oil pumps are running with adequate flow. (not applicable for P-32B)

10.5 Perform the following to stop RCP(s):

10.5.1 IF stopping Reactor Coolant Pump (P-32A), THEN perform the following:

CAUTION

Simultaneous operation of the normal and Emergency HP Oil Lift Pump (P-63 and P-80) is undesirable. Reduced oil pressure and cavitation can occur.

A. Start ONE of the following:

- HP Oil Lift Pump (P-63A)
- Emergency HP Oil Lift Pump (P-80A)

1. Place pump NOT started in PULL-TO-LOCK:

    - HP Oil Lift Pump (P-63A)
    - Emergency HP Oil Lift Pump (P-80A)

NOTE

Flow through each Backstop Lube Oil Pump and Backup Backstop Lube Oil Pump can be verified utilizing the following computer points:

- P-81A (FS-6520)
- P-82A (FS-6525)

B. Start Backup Backstop Lube Oil Pump (P-82A).

C. IF NOT running, THEN start Backstop Lube Oil Pump (P-81A).

D. Stop Reactor Coolant Pump (P-32A).

NOTE

Reactor Coolant Pump (P-32B) has a mechanical anti-reverse rotation device that is extremely noisy during coast down.

E. IF only one RCP remains running, THEN stop the remaining RCP within 2 minutes.

10.5.2 IF stopping Reactor Coolant Pump (P-32C),
THEN perform the following:

CAUTION

Simultaneous operation of the normal and Emergency HP Oil Lift Pump (P-63 and P-80) is undesirable. Reduced oil pressure and cavitation can occur.

A. Start ONE of the following:

- HP Oil Lift Pump (P-63C)
- Emergency HP Oil Lift Pump (P-80C)

1. Place pump NOT started in PULL-TO-LOCK:

   - HP Oil Lift Pump (P-63C)
   - Emergency HP Oil Lift Pump (P-80C)

NOTE

Flow through each Backstop Lube Oil Pump and Backup Backstop Lube Oil Pump can be verified utilizing the following computer points:

- P-81C (FS-6522)
- P-82C (FS-6527)

B. Start Backup Backstop Lube Oil Pump (P-82C).

C. IF NOT running,
THEN start Backstop Lube Oil Pump (P-81C).

D. Stop Reactor Coolant Pump (P-32C).

NOTE

Reactor Coolant Pump (P-32B) has a mechanical anti-reverse rotation device that is extremely noisy during coast down.

E. IF only one RCP remains running,
THEN stop the remaining RCP within 2 minutes.

10.5.3 IF stopping Reactor Coolant Pump (P-32D), THEN perform the following:

CAUTION

Simultaneous operation of the normal and Emergency HP Oil Lift Pump (P-63 and P-80) is undesirable. Reduced oil pressure and cavitation can occur.

A. Start ONE of the following:

- HP Oil Lift Pump (P-63D)
- Emergency HP Oil Lift Pump (P-80D)

1. Place pump NOT started in PULL-TO-LOCK:

- HP Oil Lift Pump (P-63D)
- Emergency HP Oil Lift Pump (P-80D)

NOTE

Flow through each Backstop Lube Oil Pump and Backup Backstop Lube Oil Pump can be verified utilizing the following computer points:

- P-81D (FS-6523)
- P-82D (FS-6528)

B. Start Backup Backstop Lube Oil Pump (P-82D).

C. IF NOT running, THEN start Backstop Lube Oil Pump (P-81D).

D. Stop Reactor Coolant Pump (P-32D).

NOTE

Reactor Coolant Pump (P-32B) has a mechanical anti-reverse rotation device that is extremely noisy during coast down.

E. IF only one RCP remains running, THEN stop the remaining RCP within 2 minutes.

10.5.4 IF stopping Reactor Coolant Pump (P-32B), THEN perform the following:

CAUTION

Simultaneous operation of the normal and Emergency HP Oil Lift Pump (P-63 and P-80) is undesirable. Reduced oil pressure and cavitation can occur.

A. Start ONE of the following:

- HP Oil Lift Pump (P-63B)
- Emergency HP Oil Lift Pump (P-80B)

1. Place pump NOT started in PULL-TO-LOCK:
   - HP Oil Lift Pump (P-63B)
   - Emergency HP Oil Lift Pump (P-80B)

NOTE

Reactor Coolant Pump (P-32B) has a mechanical anti-reverse rotation device that is extremely noisy during coast down.

B. Stop Reactor Coolant Pump (P-32B).

C. IF only one RCP remains running, THEN stop the remaining RCP within 2 minutes.

10.6 Perform the following during RCP coast down:

10.6.1 IF Reactor Coolant Pump (P-32A) stopped,
THEN verify the following pumps remain on:

- EITHER HP Oil Lift Pump (P-63A)
  OR Emergency HP Oil Lift Pump (P-80A)

- Backstop Lube Oil Pump (P-81A)

10.6.2 IF Reactor Coolant Pump (P-32C) stopped,
THEN verify the following pumps remain on:

- EITHER HP Oil Lift Pump (P-63C)
  OR Emergency HP Oil Lift Pump (P-80C)

- Backstop Lube Oil Pump (P-81C)

10.6.3 IF Reactor Coolant Pump (P-32D) stopped,
THEN verify the following pumps remain on:

- EITHER HP Oil Lift Pump (P-63D)
  OR Emergency HP Oil Lift Pump (P-80D)

- Backstop Lube Oil Pump (P-81D)

10.6.4 IF Reactor Coolant Pump (P-32B) stopped,
THEN verify HP Oil Lift Pump (P-63B) remains on.

10.7 Perform the following to check no reverse rotation when the shaft stops:

- IF desired
  OR due to RCP monitoring equipment failure,
  THEN verify Predictive Maintenance contacted to install backup indication of zero speed.

- IF associated RCS loop flow is no longer dropping,
  THEN consider the shaft stopped.

- Plant computer reverse rotation alarm remains clear.(not applicable for P-32B)

  – RCP P32-D REVERSE ROTATION (FS6513)

  – RCP P32-C REVERSE ROTATION (FS6512)

  – RCP P32-A REVERSE ROTATION (FS6510)

NOTE

Reverse rotation is indicated by the following:

- Computer alarm based on reverse lube oil flow
- RCP high vibration
- RCP motor bearing high temperature

CRITICAL STEP

10.8 IF reverse rotation indicated,
THEN perform the following:

10.8.1 Trip the reactor and perform immediate actions of Reactor Trip (1202.001).

10.8.2 Trip running RCP(s).

10.8.3 Refer to Emergency Operating Procedure (1202.XXX series).

CAUTION

- Due to Reactor Coolant Pump (P-32C) oil system re-design in 1R22, all four oil pumps (P-80C, P-63C, P-81C and P-82C) must be stopped within 25 minutes of Reactor Coolant Pump (P-32C) shaft stopping to prevent reaching thrust bearing high temperature alarm at 190°F.
- Reactor Coolant Pump (P-32B) oil system has lift oil pumps taking suction from the oil reservoir rather than the coolers thus heating up the oil (167°F alarm) after the pump shaft has stopped and must have oil pumps secured after the shaft has stopped (CR-ANO-1-2005-3096).

10.9 WHEN shaft has stopped,
THEN stop all oil pumps for the idle RCP by placing handswitches in PULL-TO-LOCK. (Backstop Lube Oil Pump not applicable to P-32B)

- Emergency HP Oil Lift Pump (P-80A thru D)
- HP Oil Lift Pumps (P-63A thru D)
- Backstop Lube Oil Pumps (P-81A, C, and D)
- Backup Backstop Lube Oil Pumps (P-82A, C, and D)

10.10 While RCS is >150°F, maintain seal injection flow and ICW flow to RCP Seal Cooling Water Heat Exchangers (E-25A thru D).

10.10.1 Maintain ICW flow to RCP Motor Air Coolers.

- RCP Motor Air Coolers (E-41A1 and E-41A2)
- RCP Motor Air Coolers (E-41B1 and E-41B2)
- RCP Motor Air Coolers (E-41C1 and E-41C2)
- RCP Motor Air Coolers (E-41D1 and E-41D2)

10.11 IF RCP stop at power,
THEN perform the following:

10.11.1 Lower the ULD HI-Load Limit 5% below runback limit.

NOTE

RCP breaker status (normal or tripped) feeds NSSS Index Point which is used in the heat balance power calculation.

10.11.2 Verify Plant Computer reflects current RCP breaker status:

- ZS1H11
- ZS1H12
- ZS1H21
- ZS1H22

A. IF breaker status is incorrect,
THEN contact Computer Support to update Plant Computer to match current breaker status.

NOTE

The Temperature Compensated Total Flow (XWRCFT) and RC Pressure (P1021, P1023, P1038, P1039) alarm limits for the Plant Computer are dependent upon RCP combination. Normally Plant Computer alarm setpoints are operator adjustable, however, these points are some of the alarm points that are blocked that are carried on Tech Spec Cross-check log (OPS-A24). Refer to Unit 1 Operations Logs (1015.003A), Attachment C for these alarm limits.

10.11.3 Request Computer Support to adjust XWRCFT and RC pressure (4 points) alarms for current RCP status.

10.11.4 Continue plant operations per Power Operation (1102.004).

SECTION 6
RCP REVERSE ROTATION

ENTRY CONDITIONS

- **Associated RCS loop flow indicates lower than expected**
- **Plant computer reverse rotation alarm on idle RCP. (not applicable for P-32B)**
  - RCP P32-A REVERSE ROTATION (FS6510)
  - RCP P32-C REVERSE ROTATION (FS6512)
  - RCP P32-D REVERSE ROTATION (FS6513)
- **RCP high vibration**
- **RCP motor bearing high temperature**
- **Loss of zero speed indication on idle RCP (Indicated by portable instrumentation).**

SECTION 6
RCP REVERSE ROTATION

INSTRUCTIONS

1. Trip reactor AND perform immediate actions of Reactor Trip (1202.001).

2. Trip running RCP(s).

3. Refer to Emergency Operating Procedure (1202.XXX).

END

REFERENCES

CR-1-92-0341 Indications of Reverse Rotation

CR-1-96-0580 Zero Speed Indication Failure

Unit 1 2016 NRC Exam

Simulator JPM

S5

JOB PERFORMANCE MEASURE

Unit: 1 Rev # 10 Date: 8/4/2016

JPM ID: ANO-1-JPM-RO-QT001 (S5)

System/Duty Area: Pressurizer Relief Tank/Quench Tank System (PRTS)

Task: Transfer the PRT (quench tank) contents

JTA# ANO1-RO-PZR-NORM-15

KA Value RO 2.9 SRO 3.1 KA Reference: 007 A1.01

Approved For Administration To: RO X SRO X

Task Location: Inside CR ______ Outside CR X Both ______

Suggested Testing Environment and Method (Perform or Simulate):

Plant Site: ______ Simulator: Perform Lab: ______

Position Evaluated: RO: ______ SRO: ______

Actual Testing Environment: Plant Site ______ Simulator ______ Lab ______

Testing Method: Perform ______ Simulate ______

Approximate Completion Time in Minutes: 7 Minutes

Reference(s): OP-1103.005 Rev. 45, PRESSURIZER OPERATION, Section 13.0

Examinee's Name: ______ ID: ______

Evaluator's Name: ______

The Examinee's performance was evaluated against the standards contained in this JPM and is determined to be:

Satisfactory: ______ Unsatisfactory: ______

Performance Checklist Comments:

______

______

______

Start Time ______ Stop Time ______ Total Time ______

*Signed ______ Date ______

*Signature indicates this JPM has been compared to its applicable procedure by a qualified individual (not the examinee) and is current with that revision.

JPM ID: ANO-1-JPM-RO-QT001

THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:

The examiner shall ensure that the examinee has been briefed on the JPM Examination Briefing Sheet EN-TQ-114 Attachment 9.5 or NUREG 1021 Appendix E.

JPM INITIAL TASK CONDITIONS:

The plant is at steady state operations. (IC 281)
The Clean Liquid Radwaste system is aligned to receive Quench Tank contents with the Vacuum Degasifier bypassed.

TASK STANDARD:

Quench Tank level lowered to ~5110 gallons without causing the low level alarm.

TASK PERFORMANCE AIDS:

OP-1103.005 Rev. 45, PRESSURIZER OPERATION, Section 13.0.

Revision 8 Note: Updated for procedure revision.

Revision 9 Note: Deleted high level condition to allow for a meaningful stopping point with possible failure criteria. If the applicant does not stop the transfer and causes a low level alarm, then they have failed the JPM.

JPM ID: ANO-1-JPM-RO-QT001

INITIATING CUE:
CRS directs you to transfer water from the Quench Tank to the clean liquid Radwaste system in accordance with OP-1103.005 starting at Step 13.5 to approximately 5110 gallons. The ATC will fill in and calculate the QT Fill rate log.

<table>
<tr><th>(C)</th><th>PERFORMANCE CHECKLIST</th><th>STANDARD</th><th>SAT</th><th>UN SAT</th><th>N/A</th></tr>
<tr><td colspan="6"><u>EXAMINER CUE</u>: IF NEEDED,
Acknowledge the applicant if he discusses the potential need to add N2 during the transfer. (Step 13.1)
Inform applicant that the Clean Liquid Radwaste System alignment has been verified aligned to receive waste water per OP-1104.020. (Step 13.2)
Inform applicant that the vacuum degasifier is bypassed per OP-1104.016. (Step 13.4)</td></tr>
<tr><td></td><td>13.5 Verify Vacuum Degasifier Outlet (HS-4614) in CWRTS position.

<u>POSITIVE CUE:</u>
HS-4614 is in CWRTS position</td><td>Applicant verified Vacuum Degasifier Outlet (HS-4614) in CWRTS position.</td><td>____</td><td>____</td><td>___</td></tr>
<tr><td colspan="6"><u>EXAMINER CUE</u>: Inform applicant that the ATC will record stop data on the Quench Tank Fillrate Log (OPS-A11)</td></tr>
<tr><td></td><td>13.6 Record Stop Data on Quench Tank Fill rate Log
(OPS-A11)

<u>POSITIVE CUE:</u>
Data entered on OPS-A11.</td><td>N/A</td><td>____</td><td>____</td><td>___</td></tr>
<tr><td>(C)</td><td>13.7 Open both Quench Tank Outlet Isolations:
• Quench Tank T42 Drain (CV-1053)
• Quench Tank T42 Drain (CV-1052)

<u>POSITIVE CUE:</u>
Red light ON and Green light OFF for:
• Quench Tank T42 Drain (CV-1053)
• Quench Tank T42 Drain (CV-1052)</td><td>Applicant Opened both:
• Quench Tank T42 Drain (CV-1053)
• Quench Tank T42 Drain (CV-1052)</td><td>____</td><td>____</td><td>___</td></tr>
<tr><td>(C)</td><td>13.8 Place Quench Tank T42 Transfer Pump (P-44) handswitch (HS-1051) to START.

<u>POSITIVE CUE:</u>
Red light ON, Green light OFF for P-44.</td><td>Applicant starts P-44, Quench Tank T42 Transfer Pump.</td><td>____</td><td>____</td><td>___</td></tr>
</table>

JPM ID: ANO-1-JPM-RO-QT001

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
EXAMINER NOTE: Per the initial conditions sampling is not desired; Steps 13.9 is N/A. N2 overpressure has been maintained, so gas sample is not required; Step 13.10 is N/A. Low Level Alarm Setpoint is <5071 gallons.					
(C)	13.11 WHEN either of the following criteria is met, • Quench Tank volume is lowered to desired volume, >5100 gallons • Quench Tank pressure drops to 1 psig THEN place Quench Tank T42 Transfer Pump (P-44) handswitch (HS-1051) to STOP. **POSITIVE CUE:** **Red light OFF, Green light ON.**	Applicant stops P-44, Quench Tank T42 Transfer Pump.	____	____	___
(C)	13.12 Close the following valves: • Quench Tank T42 Drain (CV-1052) • Quench Tank T42 Drain (CV-1053) **POSITIVE CUE:** **Green light ON and Red light OFF for:** • **Quench Tank T42 Drain (CV-1052)** • **Quench Tank T42 Drain (CV-1053)**	Applicant Closed both: • Quench Tank T42 Drain (CV-1052) • Quench Tank T42 Drain (CV-1053)	____	____	___
EXAMINER NOTE: Inform applicant JPM is complete.					

END

JPM ID: ANO-1-JPM-RO-QT001

INITIAL CONDITIONS:

The plant is at steady state operations.

The Clean Liquid Radwaste system is aligned to receive Quench Tank contents with the Vacuum Degasifier bypassed per 1104.016, to approximately 5110 gallons.

Chemistry sampling is not required.

INITIATING CUE:

CRS directs you to transfer from the Quench Tank to the Clean Liquid Radwaste system in accordance with OP-1103.005 starting at Step 13.5.

The ATC will fill in and calculate the QT Fill rate log.

13.0 Transferring from Quench Tank to Clean Liquid Radwaste System

CAUTION

- With a steam bubble in pressurizer, Quench Tank level is maintained between 4000 and 8300 gallons to provide sufficient quench cooling volume for pressurizer transients.
- Lowering Quench Tank pressure to < 1 psig indicated can cause tank collapse.

13.1 Add N_2 to Quench Tank as necessary per "Adding N_2 to the Quench Tank" section to maintain pressure ≥ 1 psig while lowering level.

13.2 Verify Clean Liquid Radwaste System aligned per "System Alignment Verification" section of Conduct of Operations (1015.001) to receive waste water.

13.3 IF desired to place Vacuum Degasifier into service, THEN perform the following:

13.3.1 Verify Vacuum Degasifier aligned per "System Alignment Verification" section of Conduct of Operations (1015.001).

13.3.2 Verify Vacuum Degasifier is in service per Vacuum Degasifier Operations (1104.016) to pump to CWRTs.

13.3.3 Notify Control Room that vacuum degasifier is ready to receive liquid.

13.4 IF desired to bypass the Vacuum Degasifier, THEN verify Vacuum Degasifier bypassed per "Vacuum Degasifier Bypass Mode Operation" section of Vacuum Degasifier Operations (1104.016).

13.5 Verify Vacuum Degasifier Outlet (HS-4614) in CWRTS position.

13.6 Record Stop Data on Quench Tank Fillrate Log (OPS-A11).

NOTE

Quench tank low level alarm setpoint is 5071 gallons.

13.7 Open both Quench Tank Outlet Isolations:

- Quench Tank T42 Drain (CV-1053)
- Quench Tank T42 Drain (CV-1052)

13.8 Place Quench Tank T42 Transfer Pump (P-44) handswitch (HS-1051) to START.

13.9 IF Quench Tank liquid sampling is desired,
THEN perform the following:

13.9.1 Notify Chemistry.

Chemistry ______________________________________

13.9.2 Open Quench Tank Trans Pump P-44 Disch Sample Vlv (SS-31).

13.9.3 WHEN sampling is complete,
THEN close Quench Tank Trans Pump P-44 Disch Sample Vlv (SS-31).

NOTE

Quench Tank gas sample is typically performed if N_2 overpressure is not being maintained during normal operation. This is due to the potential for explosive mixtures in the gas space.

13.10 IF Quench Tank N_2 overpressure is NOT being maintained during normal operation,
THEN perform Quench Tank gas sampling as follows:

13.10.1 Open the following valves:

- Quench Tank T42 Sample (CV-1845)
- Quench Tank T42 Sample (CV-1054)

13.10.2 Align H_2/O_2 Analyzer Panel to sample the Quench Tank per Hydrogen-Oxygen Analyzer System (1104.010).

A. IF H_2/O_2 Analyzer Panel (C119) is desired,
THEN align H_2/O_2 Analyzer Panel (C119) to sample the Quench Tank.

B. IF H_2/O_2 Analyzer Panel (C119A) is desired,
THEN perform the following:

1. Open Quench Tank to Sample Isolation (SS-578).

2. Select H_2/O_2 Analyzer Panel (C119A) to sample HEADER.

13.10.3 WHEN sampling is complete,
THEN perform the following:

A. Align H_2/O_2 Analyzer Panel C119 or C119A as desired per Hydrogen-Oxygen Analyzer System (1104.010).

1. IF H_2/O_2 Analyzer Panel (C119A) was selected,
THEN close Quench Tank to Sample Isolation (SS-578).

B. Close the following valves:

- Quench Tank T42 Sample (CV-1845)
- Quench Tank T42 Sample (CV-1054)

> **NOTE**
> Quench tank low level alarm setpoint is 5071 gallons.

13.11 WHEN either of the following criterion is met,

- Quench Tank volume is lowered to desired volume, > 5100 gallons
- Quench Tank pressure drops to 1 psig

THEN place Quench Tank T42 Transfer Pump (P-44) handswitch (HS-1051) to STOP.

13.12 Close the following valves:

- Quench Tank T42 Drain (CV-1052)
- Quench Tank T42 Drain (CV-1053)

13.13 Record Start Data on Quench Tank Fillrate Log OPS-A11.

13.14 IF Vacuum Degasifier is in-service for degasification, THEN secure per "Securing Vacuum Degasifier" section of Vacuum Degasifier Operations (1104.016).

13.15 Calculate Quench Tank fill rate using Quench Tank Fillrate Log OPS-A11.

Unit 1 2016 NRC Exam

Simulator JPM

S6

JOB PERFORMANCE MEASURE

Unit: 1 Rev # 2 Date: 8/4/2016

JPM ID A1JPM-RO-ED032 (S6)

System/Duty Area: ELECTRICAL DISTRIBUTION

Task: Perform Transferring Buses From Unit Aux Transformer to a Startup Transformer

JTA# ANO1-RO-ELECD-NORM-27

KA Value RO 3.1 SRO 3.1 KA Reference 062 A4.07

Approved For Administration To: RO X SRO X

Task Location: Inside CR: X Outside CR: ____ Both: ____

Suggested Testing Environment And Method (Perform or Simulate):

Plant Site: ____ Simulator: Perform Lab: ____

Position Evaluated: RO: ____ SRO: ____

Actual Testing Environment: Simulator : ____ Plant Site: ____ Lab ____

Testing Method: Simulate: ____ Perform: ____

Approximate Completion Time In Minutes: 10 Minutes

Reference(s): OP-1107.001, ELECTRICAL SYSTEM OPERATIONS, Rev. 110

Examinee's Name: ____ ID: ____

Evaluator's Name: ____

The Examinee's performance was evaluated against the standards contained in this JPM and is determined to be:

Satisfactory: ____ Unsatisfactory: ____

Performance Checklist Comments:

Start Time ____ Stop Time ____ Total Time ____

*Signed : ____ Date: ____

*Signature indicates this JPM has been compared to its applicable procedure by a qualified individual (not the examinee) and is current with that revision.

JPM ID: A1JPM-RO-ED009

THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:

The examiner shall ensure that the examinee has been briefed on the JPM Examination Briefing Sheet EN-TQ-114 Attachment 9.5 or NUREG 1021 Appendix E.

JPM INITIAL TASK CONDITIONS:

Plant is <50% power during a shutdown in preparation for 1R26.

TASK STANDARD:

All 4160 kV and 6900 kV buses powered from SU 1 Transformer only.

This is an Alternate Success Path JPM.

TASK PERFORMANCE AIDS:

OP-1107.001, ELECTRICAL SYSTEM OPERATION Step 8.0.

SIMULATOR SETUP:

Recall an IC with power <50%. (IC 281)

JPM ID: A1JPM-RO-ED032

INITIATING CUE:
The SM/CRS directs you to transfer plant auxiliaries per step 8.0 of OP-1107.001, ELECTRICAL SYSTEM OPERATIONS.

C	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
EXAMINER NOTE: Acknowledge applicant's understanding of elevated risk and if questioned, insist that they continue. EXAMINER CUE: If asked, inform the applicant that the Auto Transformer is powered from a 500 Kv source and the SU1 Automatic Voltage Regulator is In-service.					
	8.1 Perform the following: 8.1.1 Check SU1Transformer is considered operable. 8.1.2 IF time permits, THEN establish flash protection boundary at affected breakers. POSITIVE CUE: SU1 is ≥22 Kv and B0125 to SU1 is closed. Flash boundary established.	From Initial Conditions, Applicant given that SU1 is operable and flash boundary established.	____	____	___
EXAMINER NOTE: **CAUTION** – High circulating currents can trip bus lockout relay if both feeder breakers remain closed. Delaying steps which open a feeder breaker when both feeder breakers remain closed allow high circulating currents to develop.					

C	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
	8.2 <u>IF</u> desired to transfer A1 from Unit Aux to SU1, <u>THEN</u> perform the following: 8.2.1 Check Startup Xfmr #1 Feed to A1 (A-113) <u>NOT</u> in Local.	Applicant transferred A1 from Unit Aux to SU1.	____	____	____
C	**8.2.2 Place A-113 Synchronize switch to ON.**				
	8.2.3 Check synchroscope between 11 and 1 o'clock.				
C	**8.2.4 Close A-113 AND allow control switch to return to NORMAL-AFTER-CLOSE position.**				
C	**8.2.5 Place A-113 Synchronize switch to OFF.**				
	8.2.6 Check Unit Auxiliary Xfmr Feed to A1 (A-112) open. A. <u>IF</u> A-112 is <u>NOT</u> open, <u>THEN</u> trip A-112. 1. <u>IF</u> A-112 will <u>NOT</u> trip, <u>THEN</u> trip A-113. 2. Initiate Condition Report 8.2.7 <u>IF</u> A-112 opened automatically, <u>THEN</u> place A-112 control switch in NORMAL-AFTER-TRIP. **<u>POSITIVE CUE</u>:** **Amber LOCAL light OFF for A-113.** **Synchroscope at 12 o'clock.** **Red light ON, Green light OFF for A-113.** **Green light ON, Red light OFF for A-112.** **A-112 handswitch in NORMAL-AFTER-TRIP.**				

JPM ID: A1JPM-RO-ED032

C	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
	8.3 IF desired to transfer A1 from Unit Aux to SU1, THEN perform the following: 8.3.1 Check Startup Xfmr #1 Feed to A2 (A-213) NOT in Local.	Applicant transferred A2 from Unit Aux to SU1.			
C	**8.3.2 Place A-213 Synchronize switch to ON.**				
	8.3.3 Check synchroscope between 11 and 1 o'clock.				
C	**8.3.4 Close A-213 AND allow control switch to return to NORMAL-AFTER-CLOSE position.**				
C	**8.3.5 Place A-213 Synchronize switch to OFF.**				
	8.3.6 Check Unit Auxiliary Xfmr Feed to A2 (A-212) open. A. IF A-212 is NOT open, THEN trip A-212. 1. IF A-212 will NOT trip, THEN trip A-213. 2. Initiate Condition Report 8.3.7 IF A-212 opened automatically, THEN place A-212 control switch in NORMAL-AFTER-TRIP. **POSITIVE CUE:** **Amber LOCAL light OFF for A-213.** **Synchroscope at 12 o'clock.** **Red light ON, Green light OFF for A-213.** **Green light ON, Red light OFF for A-212.** **A-212 handswitch in NORMAL-AFTER-TRIP.**		____	____	____

JPM ID: A1JPM-RO-ED032

C	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
EXAMINER NOTE: During the transfer of the H1 bus H-14 will not open automatically but will open manually when the applicant takes the HS to NORMAL-AFTER-TRIP.					
ALTERNATE PATH BEGINS HERE					
	8.4 <u>IF</u> desired to transfer H1 from Unit Aux to SU1, <u>THEN</u> perform the following:	Applicant transferred H1 from Unit Aux to SU1 AND Recognized the need to manually open H-14.			
	8.4.1 Check Startup Xfmr #1 Feed to H1 (H-15) <u>NOT</u> in Local.				
C	**8.4.2 Place H-15 Synchronize switch to ON.**				
	8.4.3 Check synchroscope between 11 and 1 o'clock.				
C	**8.4.4 Close H-15 AND allow control switch to return to NORMAL-AFTER-CLOSE position.**				
C	**8.4.5 Place H-15 Synchronize switch to OFF.**				
	8.4.6 Check Unit Auxiliary Xfmr Feed to H1 (H-14) open.		____	____	____
C	**A. <u>IF</u> H-14 is <u>NOT</u> open, <u>THEN</u> trip H-14.**				
	1. <u>IF</u> H-14 will <u>NOT</u> trip, <u>THEN</u> trip H-15.				
	2. Initiate Condition Report				
	8.4.7 <u>IF</u> H-14 opened automatically, <u>THEN</u> place H-14 control switch in NORMAL-AFTER-TRIP.				
	<u>POSITIVE CUE</u>: **Amber LOCAL light OFF for H-15.** **Synchroscope at 12 o'clock.** **Red light ON, Green light OFF for H-15.** **Green light ON, Red light OFF for H-14.** **H-14 handswitch in NORMAL-AFTER-TRIP.** **Condition Report will be written by another crew member.**				
EXAMINER CUE: Inform applicant that another crew member will write the condition report.					
ALTERNATE PATH ENDS HERE					

JPM ID: A1JPM-RO-ED032

C	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
	8.5 IF desired to transfer H2 from Unit Aux to SU1, THEN perform the following:				
	8.5.1 Check Startup Xfmr #1 Feed to H2 (H-25) NOT in Local.	Applicant transferred H2 from Unit Aux to SU1.			
C	**8.5.2 Place H-25 Synchronize switch to ON.**				
	8.5.3 Check synchroscope between 11 and 1 o'clock.				
C	**8.5.4 Close H-25 AND allow control switch to return to NORMAL-AFTER-CLOSE position.**				
C	**8.5.5 Place H-25 Synchronize switch to OFF.**				
	8.5.6 Check Unit Auxiliary Xfmr Feed to H2 (H-24) open.		____	____	___
	A. IF H-24 is NOT open, THEN trip H-24.				
	1. IF H-24 will NOT trip, THEN trip H-25.				
	2. Initiate Condition Report				
	8.5.7 IF H-24 opened automatically, THEN place H-24 control switch in NORMAL-AFTER-TRIP.				
	POSITIVE CUE: **Amber LOCAL light OFF for H-25.** **Synchroscope at 12 o'clock.** **Red light ON, Green light OFF for H-25.** **Green light ON, Red light OFF for H-24.** **H-24 handswitch in NORMAL-AFTER-TRIP.**				

C	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
	8.6 Check the following bus voltages: • 4160v buses greater than 3640v (C10). • 6900v buses greater than 6010v (C10) • 480v buses between 460v and 500v (SPDS E1B5/E1B6) **<u>POSITIVE CUE</u>:** **4160v buses greater than 3640v (C10).** **6900v buses greater than 6010v (C10).** **480v buses between 460v and 500v (SPDS E1B5/E1B6).**	Applicant verified proper voltages on C10 and SPDS as appropriate.	____	____	___

END

JPM NUMBER: A1JPM-RO-ED032

INITIAL CONDITIONS:

Plant is <50% power during a shutdown in preparation for 1R26.

S/U #1 has been verified operable.

Flash protection boundary has been established at affected breakers.

INITIATING CUE:

The SM/CRS directs you to transfer plant auxiliaries per step 8.0 of OP-1107.001.

NOTE
Supplying ANO-1 from an off-site source (SU#1 and/or SU#2) will raise the risk of a grid-initiated offsite source feeder undervoltage relay actuation which will trip the offsite feeder breaker(s) to A and H buses and initiate auto-transfer of these buses to the selected offsite source (Refer to CR-ANO-2-2014-0707).

8.0 Transferring Buses from Unit Aux to SU1

8.1 Perform the following:

8.1.1 Check SU1 Transformer is considered operable.

8.1.2 IF time permits,
THEN establish flash protection boundary at affected breakers.

{4.3.4}

CAUTION
High circulating currents can trip bus lockout relay if both feeder breakers remain closed. Delaying steps which open a feeder breaker when both feeder breakers remain closed allow high circulating currents to develop.

8.2 IF desired to transfer A1 from Unit Aux to SU1,
THEN perform the following:

8.2.1 Check Startup Xfmr #1 Feed to A1 (A-113) NOT in Local.

8.2.2 Place A-113 Synchronize switch to ON.

8.2.3 Check synchroscope between 11 and 1 o'clock.

8.2.4 Close A-113 AND allow control switch to return to NORMAL-AFTER-CLOSE position.

8.2.5 Place A-113 Synchronize switch to OFF.

8.2.6 Check Unit Auxiliary Xfmr Feed to A1 (A-112) open.

CRITICAL STEP

{4.3.4}

**A. IF A-112 is NOT open,
THEN trip A-112.**

**1. IF A-112 will NOT trip,
THEN trip A-113.**

2. Initiate Condition Report.

8.2.7 IF A-112 opened automatically,
THEN place A-112 control switch in NORMAL-AFTER-TRIP.

{4.3.4}

CAUTION

High circulating currents can trip bus lockout relay if both feeder breakers remain closed. Delaying steps which open a feeder breaker when both feeder breakers remain closed allow high circulating currents to develop.

8.3 IF desired to transfer A2 from Unit Aux to SU1,
THEN perform the following:

8.3.1 Check Startup Xfmr #1 Feed to A2 (A-213) NOT in Local.

8.3.2 Place A-213 Synchronize switch to ON.

8.3.3 Check synchroscope between 11 and 1 o'clock.

8.3.4 Close A-213 AND allow control switch to return to NORMAL-AFTER-CLOSE position.

8.3.5 Place A-213 Synchronize switch to OFF.

8.3.6 Check Unit Auxiliary Xfmr Feed to A2 (A-212) open.

CRITICAL STEP

{4.3.4}

A. IF A-212 is NOT open,
THEN trip A-212.

1. IF A-212 will NOT trip,
THEN trip A-213.

2. Initiate Condition Report.

8.3.7 IF A-212 opened automatically,
THEN place A-212 control switch in NORMAL-AFTER-TRIP.

{4.3.4}

CAUTION

High circulating currents can trip bus lockout relay if both feeder breakers remain closed. Delaying steps which open a feeder breaker when both feeder breakers remain closed allow high circulating currents to develop.

8.4 IF desired to transfer H1 from Unit Aux to SU1,
THEN perform the following:

8.4.1 Check Startup Xfmr #1 Feed to H1 (H-15) NOT in Local.

8.4.2 Place H-15 Synchronize switch to ON.

8.4.3 Check synchroscope between 11 and 1 o'clock.

8.4.4 Close H-15 AND allow control switch to return to NORMAL-AFTER-CLOSE position.

8.4.5 Place H-15 Synchronize switch to OFF.

8.4.6 Check Unit Auxiliary Xfmr Feed to H1 (H-14) open.

CRITICAL STEP

{4.3.4}

**A. IF H-14 is NOT open,
THEN trip H-14.**

**1. IF H-14 will NOT trip,
THEN trip H-15.**

2. Initiate Condition Report.

8.4.7 IF H-14 opened automatically,
THEN place H-14 control switch in NORMAL-AFTER-TRIP.

{4.3.4}

CAUTION

High circulating currents can trip bus lockout relay if both feeder breakers remain closed. Delaying steps which open a feeder breaker when both feeder breakers remain closed allow high circulating currents to develop.

8.5 IF desired to transfer H2 from Unit Aux to SU1,
THEN perform the following:

8.5.1 Check Startup Xfmr #1 Feed to H2 (H-25) NOT in Local.

8.5.2 Place H-25 Synchronize switch to ON.

8.5.3 Check synchroscope between 11 and 1 o'clock.

8.5.4 Close H-25 AND allow control switch to return to NORMAL-AFTER-CLOSE position.

8.5.5 Place H-25 Synchronize switch to OFF.

8.5.6 Check Unit Auxiliary Xfmr Feed to H2 (H-24) open.

CRITICAL STEP

{4.3.4}

A. IF H-24 is NOT open,
THEN trip H-24.

1. IF H-24 will NOT trip,
THEN trip H-25.

2. Initiate Condition Report.

8.5.7 IF H-24 opened automatically,
THEN place H-24 control switch in NORMAL-AFTER-TRIP.

8.6 Check the following bus voltages:

- 4160V buses greater than 3640V (C10)
- 6900V buses greater than 6010V (C10)
- 480V buses between 460V and 500V (SPDS E1B5/E1B6)

8.6.1 IF necessary,
THEN adjust per "Startup Transformer Voltage Regulator Operation" section of this procedure.

Unit 1 2016 NRC Exam

Simulator JPM

S7

JOB PERFORMANCE MEASURE

UNIT: ______**1**_______REV # ______**6**________ DATE: ___8/4/2016____________________

JPM NUMBER:_**A1JPM-RO-RPS02 (S7)**______________

SYSTEM/DUTY AREA:_**REACTOR PROTECTION SYSTEM**____

TASK:_**REMOVE A CHANNEL OF RPS FROM MANUAL BYPASS**___________________________________

JTA#:_**ANO1-RO-RPS-NORM-6**__________________

KA VALUE RO:___**3.6**____ SRO:__**3.6**_____ KA REFERENCE:__**012 A4.03**_________________

APPROVED FOR ADMINISTRATION TO: RO:____**X**___ SRO:___**X**___

TASK LOCATION: INSIDE CR:____**X**____ OUTSIDE CR:_________ BOTH:________

SUGGESTED TESTING ENVIRONMENT AND METHOD (PERFORM OR SIMULATE):

PLANT SITE:_______________ SIMULATOR:___**PERFORM**_______ LAB:__________________

POSITION EVALUATED: RO:__________ SRO:___________

ACTUAL TESTING ENVIRONMENT: SIMULATOR:__________ PLANT SITE:__________ LAB:________

TESTING METHOD: SIMULATE:_________ PERFORM:___________

APPROXIMATE COMPLETION TIME IN MINUTES:___ **10 MINUTES**______________________________

REFERENCE(S):__**1105.001 REV. 28**____

____

EXAMINEE'S NAME:________________________________ Logon ID _______________________

EVALUATOR'S NAME:____

THE EXAMINEE'S PERFORMANCE WAS EVALUATED AGAINST THE STANDARDS CONTAINED IN THIS JPM AND IS DETERMINED TO BE:

SATISFACTORY:________________ UNSATISFACTORY:_________________

PERFORMANCE CHECKLIST COMMENTS:

____

____

____

____________ Start Time ____________ Stop Time ____________ Total Time

SIGNED ________________________________ DATE: ______________________

SIGNATURE INDICATES THIS JPM HAS BEEN COMPARED TO ITS APPLICABLE PROCEDURE BY A QUALIFIED INDIVIDUAL (NOT THE EXAMINEE) AND IS CURRENT WITH THAT REVISION.

JPM NUMBER: _ANO-1-JPM-RO-RPS02_

THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:

The examiner shall ensure that the examinee has been briefed on the JPM Examination Briefing Sheet EN-TQ-114 Attachment 9.5 or NUREG 1021 Appendix E.

JPM INITIAL TASK CONDITIONS:

The plant is operating at 100% power with ICS in automatic. The “A” RPS channel is in manual bypass for maintenance. The maintenance has been completed.

TASK STANDARD:

The “A” RPS channel is removed from manual bypass without tripping channel during JPM.

TASK PERFORMANCE AIDS:

Manual bypass key, OP-105.001 Rev. 28, Sections 8.0 and 11.0

SIMULATOR SETUP: power operations, place “A” RPS in manual bypass, select SASS Neutron Flux selector to the “Y” position. (IC 278)

JPM NUMBER: A1JPM-RO-RPS02

INITIATING CUE:

The SM/CRS directs you to remove the “A” RPS channel from manual bypass.

CRITICAL ELEMENTS (C): 3

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UNSAT	N/A
NOTE: due to the uniqueness of the design in the simulator, all channel indications are located on/in one RPS cabinet.					
	11.1. Verify channel to be removed from Manual Bypass is reset in accordance with “Resetting RPS Channels After Channel Trip” section of this procedure.	Transitions to Section 8.0 to Reset the channel.	____	____	____
	8.2 Reset “A” RPS Channel as follows:	N/A – No actions taken	____	____	____
	8.2.1 Verified all test modules are in OPERATE with the On Test lamps on DIM. **<u>POSITIVE CUE</u>:** **All test modules in OPERATE and On Test lamps are dim.** **(All 7 modules)**	Verified all test modules in Channel A RPS are in the OPERATE position and all the ON Test lamps are DIM *Source Range Test (2-1)* *Contact Monitor Test (3-1)* *Flow Test (4-1)* *Wide Range Temperature Test (5-5)* *Power Range Test (6-1)* *Pressure Test (3-5)* *Temperature Test (4-6)*	____	____	____
(C)	8.2.2 IF any bistables have Output State and/or Output Memory lamps on BRIGHT, THEN perform the following for those bistables: -Place Output State toggle switch in reset and release. -Place Output Memory toggle switch in reset and release. **<u>POSITIVE CUE</u>:** **Output State and Output Memory lamps are reset to dim.** **(Both bistables / Both lights)**	Reset any bistables with a BRIGHT Output State or Output Memory lamp and verified the lamp went dim. *High Flux (7-4)* *Power/Imbalance/Flow (4-4)*	____	____	____

JPM NUMBER: A1JPM-RO-RPS02

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UNSAT	N/A
	8.2.3 Check Building Pressure contact buffer is reset indicated by the following lamps OFF: -BLDG. High Press Trip Input State lamp - BLDG. High Press Trip Reset Input State lamp **<u>POSITIVE CUE</u>:** **Both Building Pressure contact buffer Input State lamps are off.**	Checked BLDG High Press Trip State and BLDG High Press Trip Reset Input State lamps are OFF.	____	____	____
(C)	8.2.4 Place Reactor Trip Module Subsystem Trip toggle switch in reset and release to reset Channel A Reactor Trip Module. **<u>POSITIVE CUE</u>:** **"A" Channel Reactor Trip Module is reset.**	Reset Reactor Trip Module Subsystem Trip by placing toggle switch in the reset position.	____	____	____
	8.2.5 Check Subsystem No. 1 lamps on dim for the following: -Channel A Reactor Trip module -Channel A Cabinet Indicating Panels -Channel B Reactor Trip module -Channel B Cabinet Indicating Panels -Channel C Reactor Trip module -Channel C Cabinet Indicating Panels -Channel D Reactor Trip module -Channel D Cabinet Indicating Panels **<u>POSITIVE CUE</u>:** **Subsystem No. 1 lamps for all four channels are all on dim.**	Checked Subsystem No 1 reset in Cabinet A by checking the Reactor Trip module and Cabinet Indicating Panel and is cued that Cabinets B, C, and D match Channel A.	____	____	____

<u>EXAMINER CUE</u>: Inform applicant that the other three cabinets have the same indications as "A" with the exception of the Reactor Trip Module being in bypass.

JPM NUMBER: A1JPM-RO-RPS02

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UNSAT	N/A
(C)	11.2. Turn Manual Bypass key switch on RX Trip module out of bypass position (rotate key switch counter-clockwise). **<u>POSITIVE CUE</u>:** **Keyswitch is rotated counter-clockwise**	On the Reactor Trip Module in “A” RPS, turned keyswitch counter-clockwise out of bypass position.	____	____	____
	11.3. Remove Manual Bypass key from Rx Trip module <u>AND</u> check the following: **<u>POSITIVE CUE</u>:** **Key removed from Rx Trip module.**	Removed the Manual Bypass key from the Channel A RPS Rx Trip module.	____	____	____
	11.3.1 Manual Bypass lamps on Rx Trip module AND indicating panel on dim. **<u>POSITIVE CUE</u>:** **Manual Bypass lamps are on dim.**	Checked the Manual Bypass lamps on Rx Trip module and indicating panel are on dim.	____	____	____
	11.3.2 Annunciator RPS CHANNEL BYPASSED (K08-D3) clear. **<u>POSITIVE CUE</u>:** **K08-D3 alarm clear.**	Checked K08-D3 clear.	____	____	____
	11.3.3 Associated EFIC Channel Maintenance Bypass light on solid. **<u>POSITIVE CUE</u>:** **EFIC Maintenance Bypass lamps are on solid.**	Checked EFIC Channel “A” Maintenance Bypass light on solid.	____	____	____

JPM NUMBER: A1JPM-RO-RPS02

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UNSAT	N/A
	11.4. Return Manual Bypass key to the Shift Manager **POSITIVE CUE:** **Key has been returned to the Shift Manager.**	Returned key to the Shift Manager.	____	____	____
EXAMINER NOTE: Verify applicant performing S8 is clear of the area before proceeding to next step.					
	11.5. Return SASS Neutron Flux selector switch on C03 to "SASS Enable" as follows: **POSITIVE CUE:** **None – no action should occur until the following are verified.**	N/A – No actions taken	____	____	____
	11.5.1 Compare Plant Computer point N1I56HI to N1I78HI. **POSITIVE CUE:** **N1I56HI to N1I78HI have been checked.**	Compared N1I56HI to N1I78HI using the Plant Computer indication. (May use the remote display or Plant Computer terminal)	____	____	____
	11.5.2 If the difference between the compared values is >1%, THEN place the following stations in manual …. **POSITIVE CUE:** **The difference is <1%.**	Determined the difference between N1I56HI to N1I78HI is <1%.	____	____	____
	11.5.3 Place SASS Neutron Flux selector switch (HS-509) in the "SASS Enable" position. **POSITIVE CUE:** **Neutron Flux selector switch is in SASS Enable position.**	On C03, the SASS Neutron Flux switch (HS-509) is placed in the SASS Enable position.	____	____	____

JPM NUMBER: A1JPM-RO-RPS02

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UNSAT	N/A
	11.5.4 If ICS H/A stations were placed in manual ... **POSITIVE CUE:** **No ICS stations were placed in manual.**	N/A - No ICS stations were placed in manual.	____	____	____

END

INITIAL CONDITIONS:

Plant is at 100% Power

INITIATING CUE:

The plant is operating at 100% power with ICS in automatic. The “A” RPS channel is in manual bypass for maintenance. The maintenance has been completed.

The SM/CRS directs you to remove Channel A RPS from Manual Bypass in accordance with OP-1105.001, NI & RPS Operating Procedure, Section 11.0.

11.0 Removing a RPS Channel From Manual Bypass

11.1 Verify channel to be removed from Manual Bypass is reset in accordance with “Resetting RPS Channels After Channel Trip” section of this procedure.

11.2 Turn Manual Bypass key switch on RX Trip module out of bypass position (rotate key switch counter-clockwise).

11.3 Remove Manual Bypass key from Rx Trip module AND check the following:

11.3.1 Manual Bypass lamps on Rx Trip module AND indicating panel on dim.

11.3.2 Annunciator RPS CHANNEL BYPASSED (K08-D3) clear.

11.3.3 Associated EFIC channel Maintenance Bypass light on solid.

11.4 Return Manual Bypass key to the Shift Manager.

11.5 Return SASS Neutron Flux selector switch on C03 to “SASS Enable” as follows:

11.5.1 Compare Plant Computer point N1I56HI to N1I78HI.

A. IF Plant Computer is NOT available,
THEN compare the highest of NI-5 and NI-6 to the highest of NI-7 and NI-8 on C03.

11.5.2 IF the difference between the compared values is >1%,
THEN place the following stations in manual per “Transferring Major ICS Control Stations to HAND” or “Transferring Individual Stations to Manual Control” section of Integrated Control System (1105.004):

- Diamond Panel
- Rx Demand H/A station

11.5.3 Place SASS Neutron Flux selector switch (HS-509) in the “SASS Enable” position.

11.5.4 IF ICS H/A stations were placed in manual for this step,
THEN stations may be returned to auto per “Transferring Major ICS Control Stations to Auto” or “Transferring Individual Stations to Automatic” section of ICS Operating Procedure (1105.004).

8.0 Resetting RPS Channels After Channel Trip

8.1 IF RPS channels are being reset following a Reactor Trip, THEN ensure Reactor Protection System data has been recorded in Post Transient Review (1015.037) Attachment J "Unit One Post Transient Data Summary" prior to reset of any RPS components.

8.2 Reset "A" RPS channel as follows:

8.2.1 Check all Test modules are in OPERATE with the On Test lamps on DIM.

8.2.2 IF any bistables have Output State and/or Output Memory lamps on BRIGHT, THEN perform the following for those bistables:

- Place Output State toggle switch in reset and release.
- Place Output Memory toggle switch in reset and release.

8.2.3 Check Building Pressure contact buffer reset indicated by the following lamps OFF:

- BLDG. High Press Trip Input State lamp
- BLDG. High Press Trip Reset Input State lamp

8.2.4 Place Reactor Trip Module Subsystem Trip toggle switch in reset and release to reset Channel "A" Reactor Trip Module.

8.2.5 Check Subsystem No. 1 lamps on DIM for the following:

- Channel "A" Reactor Trip module
- Channel "A" Cabinet Indicating Panel
- Channel "B" Reactor Trip module
- Channel "B" Cabinet Indicating Panel
- Channel "C" Reactor Trip module
- Channel "C" Cabinet Indicating Panel
- Channel "D" Reactor Trip module
- Channel "D" Cabinet Indicating Panel

Unit 1 2016 NRC Exam

Simulator JPM

S8

JOB PERFORMANCE MEASURE

Unit: 1 Rev # 11 Date: 8/4/2016

JPM ID: A1JPM-RO-ICW02 (S8)

System/Duty Area: Intermediate Cooling Water

Task: Perform Switching of ICW Pumps (P-33A/B/C)

JTA# ANO1-RO-ICW-NORM-27

KA Value RO 3.3 SRO 3.1 KA Reference: 008 A4.01

Approved For Administration To: RO X SRO X

Task Location: Inside CR X Outside CR ______ Both ______

Suggested Testing Environment and Method (Perform or Simulate):

Plant Site: ______ Simulator: Perform Lab: ______

Position Evaluated: RO: ______ SRO: ______

Actual Testing Environment: Plant Site ______ Simulator X Lab ______

Testing Method: Perform ______ Simulate ______

Approximate Completion Time in Minutes: 7 Minutes

Reference(s): 1104.028 ICW System Operating Procedure, (Rev 38) Section 10.1.

Examinee's Name: ______ Logon ID: ______

Evaluator's Name: ______

The Examinee's performance was evaluated against the standards contained in this JPM and is determined to be:

Satisfactory: ______ Unsatisfactory: ______

Performance Checklist Comments:

Start Time ______ Stop Time ______ Total Time ______

*Signed ______ Date ______

*Signature indicates this JPM has been compared to its applicable procedure by a qualified individual (not the examinee) and is current with that revision.

JPM ID: A1JPM-RO-ICW02

THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:

The examiner shall ensure that the examinee has been briefed on the JPM Examination Briefing Sheet EN-TQ-114 Attachment 9.5 or NUREG 1021 Appendix E.

JPM INITIAL TASK CONDITIONS:

- Unit 1 is at 100% power steady state conditions. (IC 278)
- The IAO reports that P-33A has high vibrations and is making an unusual noise.
- P-33A and P-33C ICW Pumps are presently in service.
- P-33B ICW pump has NOT been drained.

TASK STANDARD: P-33B ICW Pump supplying Non-Nuclear ICW, ICW Pump P-33A is secured.

TASK PERFORMANCE AIDS: 1104.028 Section 10.1, Placing Standby ICW Pump Into Service (P-33A, B or C).

SUGGESTED SIMULATOR SETUP: IC2 with P-33A and P-33C ICW Pumps in service, P-33B in standby.

JPM ID: A1JPM-RO-ICW02

INITIATING CUE: The CRS/SM directs you to start P-33B ICW Pump and then secure P-33A ICW Pump using 1104.028 Section 10.0 starting at Step 10.1.3.

C	PERFORMANCE CHECKLIST	STANDARD	N/A	SAT	UNSAT
	10.1 IF desired to start P-33B AND secure P-33A, AND P-33A and P-33C are running, THEN perform the following:	N/A			
EXAMINER NOTE: Step 10.1.1 will be N/A since P-33B has NOT been drained.					
C	10.1.3 Open P-33A/B Suction Cross-connect (CV-2240). **POSITIVE CUE:** **CV-2240 red light ON, green light OFF.** NEGATIVE CUE: CV-2240 green light ON, red light OFF.	Opened P-33A/B Suction Cross-connect (CV-2240) on panel C09.	_____	_____	_____
C	10.1.4 Open P-33A/B Discharge Cross-connect (CV-2238). **POSITIVE CUE:** **CV-2238 red light ON, green light OFF.** NEGATIVE CUE: CV-2238 green light ON, red light OFF.	Opened P-33A/B Discharge Cross-connect (CV-2238) on panel C09.	_____	_____	_____

JPM ID: A1JPM-RO-ICW02

C	PERFORMANCE CHECKLIST	STANDARD	N/A	SAT	UNSAT
	10.1.5 Vent P-33B as necessary by opening ICW Pump Vent (ICW-1191) A. Close ICW Pump P-33B Vent (ICW-1191). **EXAMINER CUE:** **IAO reports that the B ICW Pump has been vented and ICW-1191 is closed.**	Directed Outside operator to vent P-33B and then close ICW-1191.	_____	_____	_____
EXAMINER CUE: Inform Examinee that the B ICW pump has been vented; ICW-1191 is closed.					
C	10.1.6 Start ICW Pump P-33B. A. IF CRD cooling pumps indicate air binding (i.e. lowering pump discharge pressure, flow oscillations or standby pump start), THEN perform “Venting CRD Cooling System Components”, exhibit of this procedure. **POSITIVE CUE:** **Red light ON, green light OFF for P-33B.** NEGATIVE CUE: Green light ON, red light OFF for P-33B.	Started ICW Pump P-33B using handswitch on panel C09.	_____	_____	_____
EXAMINER CUE: If asked, the CRD cooling pumps do not indicate air binding locally.					

JPM ID: A1JPM-RO-ICW02

C	PERFORMANCE CHECKLIST	STANDARD	N/A	SAT	UNSAT
EXAMINER CUE: After P-33B has been started, inform Examinee that three minutes have elapsed (time compression).					
C	10.1.7 WHEN P-33B has run at least 3 minutes, THEN stop P-33A. **POSITIVE CUE:** **Green light ON, red light OFF for P-33A.** NEGATIVE CUE: Red light ON, green light OFF for P-33A.	Waited ~3 minutes and then placed the handswitch for ICW Pump P-33A in the trip/stop position.	_____	_____	_____
	10.1.8 On C09, check flow is normal (~2000 gpm) on ICW Coolers Inlet Flow Non-Nuc (FI-2218). **POSITIVE CUE:** **Flow is ~2400 gpm on FI-2218.**	Checked normal ICW flow on FI-2218 on C09 for the Non-Nuclear loop.	_____	_____	_____
	10.1.9 IF desired, THEN station operator to monitor ICW Surge Tanks for overflow. **EXAMINER CUE:** **OAO reports that the ICW Surge Tanks are not overflowing.**	Checked with OAO to verify status of T-37A/B overflow.	_____	_____	_____
EXAMINER CUE: If asked, report as OAO that the ICW Surge Tanks are NOT overflowing.					
Inform the examinee that the JPM is complete.					

END

JPM ID: A1JPM-RO-ICW02

INITIAL CONDITIONS:

- **Unit 1 is at 100% power steady state conditions.**
- **The IAO reports that P-33A has high vibrations and is making an unusual noise.**
- **P-33A and P-33C ICW Pumps are presently in service.**
- **P-33B ICW pump has NOT been drained.**
- **T-37A and T-37B have been cross-connected by the OAO.**
- **P-33B has been verified ready to start and the IAO is standing clear.**

INITIATING CUE:

The CRS/SM directs you to start P-33B ICW pump and then secure P-33A ICW pump using 1104.028 Section 10.0 starting at Step 10.1.3.

10.0 Placing Standby ICW Pump Into Service (P-33A, B, or C)

CAUTION

When switching ICW Pump alignment, running both pumps in parallel for 3 minutes reduces the possibility of trapped air causing a system transient.

NOTE

- Stopping an ICW pump can cause CRD SUPPLY FILTER ΔP HI (K08-D1) and RCP MOTOR COOLING FLOW LO (K08-E6).
- The Non-Nuclear loop normally has a higher activity level than Nuclear loop. If both loops are crossconnected via the ICW Surge Tank drain line, Non-Nuclear loop process monitor activity will lower and Nuclear loop process monitor activity will rise, possibly to the alarm setpoint.

10.1 IF desired to start P-33B AND secure P-33A, AND P-33A and P-33C are running, THEN perform the following:

CAUTION

- During filling of P-33A ICW pump following maintenance, air entrained in the ICW system following venting was carried throughout the system resulting in air binding of ICW components. CR-ANO-1-2006-00612
- Restoration of an ICW pump following maintenance with ONLY one train of CRD cooling available should be evaluated prior to starting. Air entrained in the ICW pump discharge can degrade CRD cooling flow.
- Leakage between ICW loops can foul CRD Filters. When there is leakage between loops, raise monitoring of CRD Pre-filters (F-61A & B) and CRD Cooling Water Filters (F-20A & B).
- Opening the ICW pump discharge cross-connect valve(s) prior to opening the suction cross-connect valve(s) can result in overflowing the Nuclear ICW Surge Tank due to pressure differences in the ICW loops.

10.1.1 IF ICW Pump P-33B has been drained, THEN perform the following:

A. Verify the following valves closed:

- ICW Pump P-33B Disch Isol (ICW-3B)
- ICW Pump P-33B Suct Isol (ICW-1B)
- ICW Pump P-33B Vent (ICW-1191)
- ICW Pump P-33B Disch Line Drain (ICW-1177A)
- ICW Pump P-33B Suct Line Drain (ICW-1177B)

B. Periodically monitor ICW expansion tank level during refill.

C. Slowly open ICW Pump P-33B Suct Isol (ICW-1B).

D. Throttle open ICW Pump P-33B Disch Line Drain (ICW-1177A).

E. WHEN air is vented,
THEN close ICW Pump P-33B Disch Line Drain (ICW-1177A).

F. Open ICW Pump P-33B Disch Isol (ICW-3B).

G. Vent all of the CRD Cooling system components per "Venting CRD Cooling System Components", exhibit of this procedure.

10.1.2 IF it is desired to cross-connect ICW Surge Tk T-37A and T-37B via bottom drain line,
THEN perform the following:

A. Install plug on the ICW surge tanks drain line.

B. Open ICW Surge Tk T-37A Drn to Aux Bldg (ICW-130A).

C. Open ICW Surge Tk T-37B Drn to Aux Bldg (ICW-130B).

10.1.3 Open P-33A/B Suction Crossconnect (CV-2240).

10.1.4 Open P-33A/B Discharge Crossconnect (CV-2238).

10.1.5 Vent P-33B as necessary by opening ICW Pump P-33B Vent (ICW-1191).

A. Close ICW Pump P-33B Vent (ICW-1191).

10.1.6 Start P-33B.

A. IF CRD cooling pumps indicate air binding (i.e. lowering pump discharge pressure, flow oscillations or standby pump start),
THEN perform "Venting CRD Cooling System Components", exhibit of this procedure.

NOTE

Pressure and flow instabilities from stopping P-33A in the next step can cause a CRD cooling pump (P-79A/B) to auto-start.

10.1.7 WHEN P-33B has run at least 3 minutes,
THEN stop P-33A.

NOTE

- ICW pumps are rated for a maximum 2500 gpm flow.
- Max indicated ICW Cooler Inlet Flow (FI-2219, FI-2218) is 2500 gpm.

10.1.8 On C09, check flow is normal (~2000 gpm) on ICW Coolers Inlet Flow Non-Nuc (FI-2218).

10.1.9 IF desired,
THEN station operator to monitor ICW Surge Tanks for overflow.

Unit 1 2016 NRC Exam

In-plant JPM

P1

JOB PERFORMANCE MEASURE

Unit: 1 Rev # 3 Date: 7/29/16

JPM ID: A1JPM-RO-GEN02 (P1)

System/Duty Area: Turbine Generator Gas System

Task: Purging Hydrogen with $C0_2$ During Emergency Conditions (Station Blackout)

JTA# ANO1-RO-EOP-EMERG-36 and ANO1-SRO-EOP-EMERG-37

KA Value RO 3.5 SRO 3.9 KA Reference 055 EA1.04

Approved For Administration To: RO X SRO X

Task Location: Inside CR: ____ Outside CR: X Both: ____

Suggested Testing Environment And Method (Perform or Simulate):

Plant Site: Simulate Simulator: ____ Lab: ____

Position Evaluated: RO: ____ SRO: ____

Actual Testing Environment: Simulator : ____ Plant Site: X Lab: ____

Testing Method: Simulate: X Perform: ____ Alternate Path: X

Approximate Completion Time In Minutes: 15 Minutes

Reference(s): 1106.002 Generator Hydrogen System

Examinee's Name: ____ Logon ID: ____

Evaluator's Name: ____

The Examinee's performance was evaluated against the standards contained in this JPM and is determined to be:

Satisfactory: ____ Unsatisfactory: ____

Performance Checklist Comments:

Start Time ____ Stop Time ____ Total Time ____

*Signed ____ Date: ____

*Signature indicates this JPM has been compared to its applicable procedure by a qualified individual (not the examinee) and is current with that revision.

JPM ID: A1JPM-RO-GEN02

THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:

The examiner shall ensure that the examinee has been briefed on the JPM Examination Briefing Sheet EN-TQ-114 Attachment 9.5 or NUREG 1021 Appendix E.

JPM INITIAL TASK CONDITIONS:

A station blackout is in progress and it is necessary to reduce loads on the station batteries. To accomplish this, it is necessary to purge the hydrogen from the generator with C02 to secure the Seal Oil System DC pump.

TASK STANDARD:

Main generator was purged with 15 bottles of C02. Generator pressure is ~zero.

TASK PERFORMANCE AIDS:

1106.002 Generator Hydrogen System, Section 15.0 Purging Hydrogen with C02 During Emergency Conditions.

This is an alternate path JPM

JPM ID: A1JPM-RO-GEN02

INITIATING CUE: The SM/CRS directs you to purge the Main Generator with 15 bottles of C02 per 1106.002 Section 15.0.

C	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
TRANSITION NOTE: The examinee should proceed to the Isophase bus deck on 354' elevation of the turbine building. EXAMINER NOTE: During a Blackout, generator pressure may be read on the following: • Gen H_2 Cond Mon Press (PI-9003), located beside the Generator Condition Monitor (AI-9002). • Main Generator Pressure (PI-8370), located inside upper door of H_2 Control Panel (M-27). • Gen H_2/Fan Press on front of H_2 Control Panel (M-27).					
	15.1.1. Verify H_2 Supply to Top of Generator valve is closed. **<u>POSITIVE CUE</u>:** **H_2-132 is closed.**	Operator verified H_2 Supply to Top of Generator valve (H_2-132) is closed.	____	____	____
C	15.1.2. Open H2 Vent, Lead Box valve H_2-113. **<u>POSITIVE CUE</u>:** **H_2-113 is open.** <u>NEGATIVE CUE</u>: H_2 pressure is NOT lowering on any working pressure indicator.	Operator opened H_2 Vent, Lead Box valve H_2-113.	____	____	____
C	15.1.3. Open H2 Vent from Top of Generator valve, H_2-112. **<u>POSITIVE CUE</u>:** **H_2-112 is open. Generator pressure is lowering. (PI-9002A = 0 psig)** <u>NEGATIVE CUE</u>: H_2 pressure is NOT lowering on any working pressure indicator.	Operator opened H_2 Vent from Top of Generator valve H_2-112.	____	____	____
<u>EXAMINER NOTE</u>: To facilitate the next step inform the examinee that generator pressure is 0 psig when the examinee checks generator pressure.					

C	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
C	15.2. When generator pressure lowers to ~0 psig, close H_2-113. **<u>POSITIVE CUE</u>:** **H_2-113 is closed.**	When generator pressure is given as ~0 psig, operator closed H_2-113.	____	____	____
C	15.3.1. Open CO_2 Supply Isolation to Unit 1 Generator on Isophase Bus Deck (CO_2-66). **<u>POSITIVE CUE:</u>** **CO_2-66 is open.**	Opened CO_2 Supply Isolation to Unit 1 Generator on Isophase Bus Deck (CO_2-66).	____	____	____
<u>TRANSITION NOTE</u>: The examinee should proceed to the generator gas house.					
C	15.3.2. Open PCV-8303 Inlet Isolation valve (CO_2-8311). **<u>POSITIVE CUE</u>:** **CO_2-8311 is open.**	Opened PCV-8303 Inlet Isolation valve (CO_2-8311).	____	____	____
	15.3.3. Verify 15 CO_2 manifold valves open. **<u>POSITIVE CUE</u>:** **15 CO_2 manifold valves are open.**	Verified 15 CO_2 manifold valves are open.	____	____	____
C	15.3.4. Open the 15 CO_2 Bottle Isolation Valves associated with the open CO_2 manifold valves. **<u>POSITIVE CUE:</u>** **15 $C0_2$ bottle isolation valves are open.**	Opened 15 CO_2 Bottle Isolation Valves associated with the open CO_2 manifold valves.	____	____	____
	15.3.5. Adjust CO_2 Supply Pressure Regulator (PCV-8303) clockwise NOT to exceed 80 psig. Do not allow generator pressure to exceed 3 psig. **<u>POSITIVE CUE</u>:** **CO_2 outlet pressure increased from 0 to ~75 psig. Generator pressure is ~1 psig.** <u>NEGATIVE CUE</u>: CO_2 outlet pressure is 0 psig.	Adjusted CO_2 Supply Pressure Regulator (PCV-8303) clockwise and did NOT exceed 80 psig. Did not allow generator pressure to exceed 3 psig. (Must call the control room for generator pressure)	____	____	____

<table>
<tr><th>C</th><th>PERFORMANCE CHECKLIST</th><th>STANDARD</th><th>SAT</th><th>UN SAT</th><th>N/A</th></tr>
<tr><td colspan="6"><u>EXAMINER CUE</u>: When the above steps have been accomplished inform examinee that flow noise has stopped, header pressure is 1500 psig, and PCV-8303 is frosted over. ALTERNATE PATH STARTS HERE</td></tr>
<tr><td>C</td><td>15.3.6. Open CO2 Supply Regulator PCV-8303 Bypass (CO2-8303-3) as needed to continue purge while maintaining $\leq$80 psig on PCV-8303 Outlet Pressure Indicator (PI-8303).

<u>POSITIVE CUE</u>:
CO_2 outlet pressure is ~75 psig. Generator pressure is ~2 psig.

<u>NEGATIVE CUE</u>:
CO_2 outlet pressure is 0 psig.</td><td>Adjust CO2 Supply Pressure using Regulator Bypass (CO2-8303-3) counterclockwise and did NOT exceed 80 psig. Did not allow generator pressure to exceed 3 psig.</td><td>____</td><td>____</td><td>____</td></tr>
<tr><td colspan="6"><u>EXAMINER CUE</u>: When the above steps have been accomplished inform examinee that header pressure is 2 psig and flow noise has stopped. (This is to indicate that the15 bottles have been added to the generator)</td></tr>
<tr><td></td><td>15.3.7. When all 15 bottles have been added, notify the SM/CRS.

<u>POSITIVE CUE</u>:
All 15 bottles added and SM/CRS notified.</td><td>Called SM/CRS by telephone or radio and reported all 15 bottles added to generator.</td><td>____</td><td>____</td><td>____</td></tr>
</table>

END

JPM ID: A1JPM-RO-GEN02

INITIAL CONDITIONS:

- **A station blackout is in progress and it is necessary to reduce loads on the station batteries.**
- **To accomplish this, it is necessary to purge the hydrogen from the generator with C02 to secure the Seal Oil System DC pump.**

INITIATING CUE:

SM/CRS directs you to purge the Main Generator with 15 bottles of C02 per 1106.002 Section 15.0.

15.0 Purging Hydrogen with CO_2 During Emergency Conditions

15.1 Perform the following to depressurize generator:

15.1.1 Verify H_2 Supply to Top of Generator (H_2-132) closed.

15.1.2 Open H_2 Vent, Lead Box (H_2-113).

15.1.3 Open H_2 Vent from Top of Generator (H_2-112).

NOTE

During a blackout, generator pressure may be read on the following:

- Gen H_2 Cond Mon Press (PI-9003), located beside the Generator Condition Monitor (AI-9002)
- Main Generator Pressure (PI-8370), located inside upper door of H_2 Control Panel (M-27)
- Gen H_2/Fan Press on front of H_2 Control Panel (M-27)

15.2 WHEN generator pressure is ~0 psig,
THEN close H_2 Vent, Lead Box (H_2-113).

15.3 Perform the following to purge generator:

15.3.1 Open CO_2 Supply Isolation to Unit 1 Generator on Isophase Bus Deck (CO_2-66).

15.3.2 Open CO_2 Supply Regulator PCV-8303 Inlet Isol (CO_2-8311).

NOTE

The alignment of 15 CO_2 cylinders at one time is based on purging the generator with 1.5 times its internal volume with CO_2.

15.3.3 Verify 15 CO_2 manifold valves open.

15.3.4 Open the 15 CO_2 Bottle isolation Valves associated with the open CO_2 manifold valves.

15.3.5 Admit CO_2 to generator by adjusting CO_2 Supply Pressure Regulator (PCV-8303) clockwise NOT to exceed 80 psig. Do NOT allow generator pressure to exceed 3 psig.

15.3.6 IF PCV-8303 freezes and stops flow,
THEN open CO_2 Supply Regulator PCV-8303 Bypass (CO_2-8303-3) as needed to continue purge while maintaining $\leq$80 psig on PCV-8303 Outlet Pressure Indicator (PI-8304).

15.3.7 WHEN all 15 bottles have been added,
THEN notify CRS/SM.

15.4 Perform the following to align Purity Meter (AIS-8310) for CO_2:

15.4.1 Open the following valves:

- Purity Meter Sample Return Isol to Top of Generator (H_2-114)
- Purity Meter Sample Supply Isol from Top of Generator (H_2-116)

15.4.2 Close the following valves:

- Purity Meter Sample Return Isol to Bottom of Generator (H_2-115)
- Purity Meter Sample Supply Isol from Bottom of Generator (H_2-117)

15.5 Perform the following to check purity:

15.5.1 IF electrical power available to Purity Meter Blower (VSF-31),
THEN read Purity Meter (AIS-8310).

15.5.2 IF Purity Meter NOT available
OR as desired,
THEN request Chemistry sample of generator.

Chemistry ______________________________

15.6 Continue purging generator as required to obtain $\geq$95% CO_2.

15.6.1 Replace CO_2 bottles as necessary.

15.7 WHEN CO_2 purity ≥95%,
THEN perform the following:

15.7.1 Close H_2 Vent from Top of Generator (H_2-112).

15.7.2 Close CO_2 Bottle isolations.

15.7.3 Purge low points by opening H_2 Vent, Lead Box (H_2-113) for ~2 minutes.

A. WHEN purge is complete,
THEN close H_2 Vent, Lead Box (H_2-113).

15.7.4 Close CO_2 Supply Regulator PCV-8303 Inlet Isol (CO_2-8311).

15.7.5 Verify CO_2 Supply Regulator PCV-8303 Bypass (CO_2-8303-3) closed.

15.7.6 Replace used CO_2 bottles.

15.7.7 Close CO_2 Supply Isolation to Unit 1 Generator on Isophase Bus Deck (CO_2-66).

Unit 1 2016 NRC Exam

In-plant JPM

P2

JOB PERFORMANCE MEASURE

Unit: 1 Rev # 14 Date: 8/4/16

JPM ID: A1JPM-RO-CRD04 (P2)

System/Duty Area: Control Rod Drive System/Emergency and Abnormal Operations

Task: Respond to High Temperature on one or more Control Rod Drive Stators

JTA# ANO1-RO-AOP-OFFNORM-394

KA Value RO 3.1 SRO 3.7 KA Reference: 001 A2.01

Approved For Administration To: RO X SRO X

Task Location: Inside CR ______ Outside CR X Both ______

Suggested Testing Environment and Method (Perform or Simulate):

Plant Site: Simulate Simulator: ______ Lab: ______

Position Evaluated: RO: ______ SRO: ______

Actual Testing Environment: Plant Site X Simulator ______ Lab ______

Testing Method: Perform ______ Simulate X

Approximate Completion Time in Minutes: 10 Minutes

Reference(s): 1203.003 Section 7 CRD Stator Temperature High and Exhibit A CRD Fuse Location Reference

Examinee's Name: ______ Logon ID: ______

Evaluator's Name: ______

The Examinee's performance was evaluated against the standards contained in this JPM and is determined to be:

Satisfactory: ______ Unsatisfactory: ______

Performance Checklist Comments:

______

______

______

Start Time ______ Stop Time ______ Total Time ______

*Signed ______ Date ______

*Signature indicates this JPM has been compared to its applicable procedure by a qualified individual (not the examinee) and is current with that revision.

JPM ID: A1JPM-RO-CRD04

THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:

The examiner shall ensure that the examinee has been briefed on the JPM Examination Briefing Sheet EN-TQ-114 Attachment 9.5 or NUREG 1021 Appendix E.

JPM INITIAL TASK CONDITIONS:

- Group 7 Rod 2 control rod stator temperature computer alarm is in alarm with an indicated temperature of 197°F.
- Reactor power is ~35% with the Reactor Demand and Diamond stations in manual.
- Group 7 Rod 2 has been transferred to the AUX power supply.

TASK STANDARD:

Group 7 Rod 2 is de-energized and the AUX Programmer is energized.

TASK PERFORMANCE AIDS:

Copy of AOP 1203.003 Section 7, Picture of inside Cabinet C72, and Exhibit ‘A.’

JPM ID: A1JPM-RO-CRD04

INITIATING CUE: The CRS/SM directs you to de-energize CRD Group 7 Rod 2 and re-energize the AUX Programmer per 1203.003, Section 7, Step 4 (perform steps 4.E through 4.I).

C	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
<u>EXAMINER NOTE</u>: Do not let examinee open cabinet. Use “Programmer Power Supply” picture to identify fuses to be pulled once the proper cabinet has been identified.					
C	E. In computer room at the Auxiliary Power Supply A cabinet (C72), remove the following fuses from the programmer control assembly to de-energize auxiliary power supply and drop affected rod. 1) 120 V ABT 2) 120 V Bus 2 **<u>POSITIVE CUE</u>:** **Provide applicant picture of the inside of Cabinet C72 (Exhibit 1)** **Fuses 120 V ABT and 120 V Bus 2 removed.** **<u>NEGATIVE CUE</u>**: If applicant opens west side door, he will see wires but no fuses.	Opened C72 ‘A’ cabinet door and removed fuses 120 V ABT and 120 V Bus 2. (NOTE: C72 can be opened from either the east or west side. The east side is the correct side and has a placard that lists the components inside. 1. Programmer control assembly 2. Trip 3/Trip 4 Electronic trip indicating lights 3. Electronic trip reset button 4. Gate drive assemblies)	____	____	____
<u>EXAMINER NOTE</u>: Simulate communications with control room. If required, inform examinee that the control room is handling the appropriate Technical Specification actions.					
	F. Verify IN LIMIT lamp on for selected rod (Group 7 Rod 2) on PI Panel (C13). **<u>EXAMINER CUE</u>:** **Control Room reports Group 7 Rod 2 IN LIMIT light is lit.**	Called the control room and verified Group 7 Rod 2 IN LIMIT lamp is lit.	____	____	____
	F. 1) Declare rod inoperable AND refer to applicable TS 3.1.4, and TS 3.1.5 2) **<u>IF</u>** required to perform SR 3.2.5.1, **<u>THEN</u>** perform Power Peaking check (1103.019). **<u>EXAMINER CUE:</u>** **Control Room reports referring to TS 3.1.4, 3.1.5. and SR 3.2.5.1**	Called the control room and reported to declare rod inoperable AND refer to applicable TS 3.1.4 and TS 3.1.5.	____	____	____

JPM ID: A1JPM-RO-CRD04

<table>
<tr><th>C</th><th>PERFORMANCE CHECKLIST</th><th>STANDARD</th><th>SAT</th><th>UN SAT</th><th>N/A</th></tr>
<tr><td colspan="6"><u>NOTE</u>
The CRD stator fuses are mounted in groups of three on fuse blocks, two fuse blocks per stator.</td></tr>
<tr><td></td><td>G. Using Control Rod Stator Fuse Location Reference (Exhibit A) of this procedure, identify the fuse blocks and CRD transfer cabinet associated with the affected rod (Group 7 Rod 2).</td><td>Used Exhibit A to determine correct fuses and location are FB17 and FB18 in C55.</td><td>____</td><td>____</td><td>____</td></tr>
<tr><td colspan="6"><u>EXAMIINER NOTE</u>: For the purpose of the JPM the examinee should discuss proper electrical safety and the gear required and the location (per Exhibit A) of the fuses which should be pulled. Warning in procedure states “Personnel should use proper electrical safety gear (face shield, rubber gloves and fuse pullers as a minimum) when removing fuses”. The tools and PPE are available in the control room or from the breaker deck near the H1 and H2 busses. Do not let examinee open cabinet. Use “Fuse Block” picture to identify fuses to be pulled once the proper cabinet has been identified</td></tr>
<tr><td colspan="6"><u>WARNING</u>

CRD transfer cabinet will be energized.</td></tr>
<tr><td>C</td><td>H. Using proper electrical safety precautions (face shield, rubber gloves, fuse pullers, etc.), remove the six stator fuses associated with the affected rod (Group 7 Rod 2).

(Examinee should not open cabinet. Use Exhibit to discuss where these fuses would be located inside the cabinet.)

<u>POSITIVE CUE:</u>
Provide applicant picture of the inside of Cabinet C55, Exhibit 2 and after he identifies the fuses to be pulled provide Exhibit 3 FB17 and FB18 removed.

<u>NEGATIVE CUE</u>
If applicant opens west side door, he will see the patch cords for the CRDs but no fuses.</td><td>Using proper electrical safety gear removed FB17 and FB18 in C55.
(NOTE: C55 can be opened from either the east or west side. The east side is the correct side and has a placard that lists the components inside.
1. CRD transfer relays
2. CRD output fuses
3. CRDM output fuse blown indicators)</td><td>____</td><td>____</td><td>____</td></tr>
<tr><td>C</td><td>I. Re-install the Auxiliary Power Supply programmer assembly fuses removed from C72.

1) 120 V ABT
2) 120 V Bus 2

<u>POSITIVE CUE:</u>
Fuses are re-installed in the Aux Programmer. (Use Exhibit 1 again)</td><td>120-V ABT and 120V Bus 2 fuses installed in Aux Programmer.

(Use picture again)</td><td>____</td><td>____</td><td>____</td></tr>
</table>

END

JPM ID: A1JPM-RO-CRD04

INITIAL CONDITIONS:

- **Group 7 Rod 2 control rod stator temperature computer alarm is in alarm with an indicated temperature of 197°F.**
- **Reactor power is ~35% with the Reactor Demand and Diamond stations in manual.**
- **Group 7 Rod 2 has been transferred to the AUX power supply.**

INITIATING CUE:

The CRS/SM directs you to de-energize CRD Group 7 Rod 2 and re-energize the AUX Programmer per 1203.003, Section 7, Step 4 (perform steps 4.E through 4.I).

SECTION 7
CRD STATOR TEMPERATURE HIGH
INSTRUCTIONS

1. Verify CRD cooling source in-service while continuing with this procedure:

- **Both CRD Cooling Pump (P-79A and P-79B) in-service, if available.**
- **Verify non-nuclear ICW temperature and flow are normal (C09).**
- **Check local CRD cooling water supply filter and pre-filter ΔP's in ammonia pump pit.**
- **Vent CRD cooling water pumps, filters and high points on lines per "Venting CRD Cooling System Components" Exhibit A of ICW System Operating Procedure (1104.028).**

2. Use one or the both of the following to trend CRD motor temperatures until temperatures stabilize: ←

- **CRD Temperature trends on PDS/PMS**
- **From plant computer, obtain CRD Motor Temperature Reports (computer function: NAS, N4, F4, 2, Enter, Enter) at ~5 minute intervals or more often as necessary.**

NOTE

Since Group 8 rods will not drop when de-energized, manual Rx trip is only required if more than one rod in Groups 1-7 is >180°F.

3. <u>IF</u> more than one CRD stator in Groups 1-7 exceeds 180°F,
<u>THEN</u> trip the reactor and perform Reactor Trip (1202.001). ←

SECTION 7 - CRD STATOR TEMPERATURE HIGH

4. IF only one CRD stator temperature in Groups 1-7 exceeds 180°F due to an event which is confined to that stator alone,
THEN proceed as follows:

A. Perform Rapid Plant Shutdown (1203.045) in conjunction with this procedure.

B. Reduce neutron power to <40% of 902 MWe (<360 MWe).

C. Take manual control of reactor demand H/A station and Diamond panel.

D. Transfer affected rod to AUX supply per "Transfer to Auxiliary Supply" section of CRD System Operating Procedure (1105.009).

E. In computer room at the Auxiliary Power Supply A cabinet (C72), remove the following fuses from the programmer control assembly to de-energize auxiliary power supply and drop affected rod.

1) 120 V ABT

2) 120 V Bus 2

F. Verify IN LIMIT lamp on for selected rod on PI Panel (C13).

1) Declare rod inoperable AND refer to applicable TS 3.1.4, and TS 3.1.5.

2) **IF** required to perform SR 3.2.5.1,
THEN perform Power Peaking check (1103.019).

NOTE
The CRD stator fuses are mounted in groups of three on fuse blocks, two fuse blocks per stator.

G. Using Control Rod Stator Fuse Location Reference (Exhibit A) of this procedure, identify the fuse blocks and CRD transfer cabinet associated with affected rod.

WARNING
CRD transfer cabinet will be energized.

H. Using proper electrical safety precautions (face shield, rubber gloves, fuse pullers, etc.), remove the six stator fuses associated with the affected rod.

(4. CONTINUED NEXT PAGE)

SECTION 7 - CRD STATOR TEMPERATURE HIGH

4. (Continued)

I. Re-install the Auxiliary Power Supply programmer assembly fuses removed from C72.

   1) 120V ABT

   2) 120V Bus 2

J. Transfer affected rod circuitry back to its group power supply.

K. **IF** desired,
   THEN return ICS to automatic.

L. Within 1 hour of declaring rod inoperable and once every 12 hours thereafter, verify 1.5% available shutdown margin per Reactivity Balance Calculation (1103.015), or initiate boration to restore SDM to be within COLR limit within 1 hour (TS 3.4.1 Condition A).

M. Collect the following plant computer printouts from NASP menu, "OPS Procedure 1203.003" selection:

   - Uncorrected SPND Signals
   - Imbalance, Tilt and Rod Index
   - Corrected SPND Signals

N. Consult Senior Manager, Operations and Reactor Engineering personnel.

O. Monitor core quadrant tilt for limits specified in COLR, and TS 3.2.4.

SECTION 7 - CRD STATOR TEMPERATURE HIGH

**5. IF only Group 8 rod(s) are affected,
THEN perform the following:**

A. Take manual control of reactor demand H/A station and Diamond panel.

B. Transfer affected rod to AUX supply per CRD System Operating Procedure (1105.009), "Transfer to Auxiliary Supply" section.

C. In computer room at the Auxiliary Power Supply A cabinet (C72), remove the following fuses from the programmer control assembly to de-energize auxiliary power supply.

1) 120 V ABT

2) 120 V Bus 2

D. Declare rod inoperable AND refer to TS 3.1.6.

NOTE

The CRD stator fuses are mounted in groups of three on fuse blocks, two fuse blocks per stator.

E. Using Control Rod Stator Fuse Location Reference (Exhibit A) of this procedure, identify the fuse blocks in CRD transfer cabinet C61 associated with affected rod(s).

WARNING

CRD transfer cabinet will be energized.

F. Using proper electrical safety precautions (face shield, rubber gloves, fuse pullers, etc.), remove the six stator fuses associated with the affected rod(s).

(5. CONTINUED NEXT PAGE)

SECTION 7 - CRD STATOR TEMPERATURE HIGH

5. (Continued)

G. Re-install the Auxiliary Power Supply programmer assembly fuses removed from C72.

   1) 120V ABT

   2) 120V Bus 2

H. Transfer affected rod circuitry back to Group 8 power supply.

I. **IF** desired,
THEN return ICS to automatic.

J. Collect the following plant computer printouts from NASP menu, "OPS Procedure 1203.003" selection:

   - Uncorrected SPND Signals
   - Imbalance, Tilt and Rod Index
   - Corrected SPND Signals

K. Consult Senior Manager, Operations and Reactor Engineering personnel.

L. Monitor core quadrant tilt for limits specified in COLR, and TS 3.2.4.

END

EXHIBIT A
1203.003 Page 1 of 2
CONTROL ROD STATOR FUSE LOCATION REFERENCE
Revised 4/11/95

GROUP	ROD	STATOR FUSE BLOCKS	FUSE BLOCK LOCATION	GROUP	ROD	STATOR FUSE BLOCKS	FUSE BLOCK LOCATION
1	1	FB5 & FB6	C55	5	1	FB9 & FB10	C55
1	2	FB3 & FB4	C55	5	2	FB11 & FB12	C55
1	3	FB5 & FB6	C54	5	3	FB7 & FB8	C55
1	4	FB3 & FB4	C56	5	4	FB7 & FB8	C54
1	5	FB5 & FB6	C59	5	5	FB9 & FB10	C56
1	6	FB5 & FB6	C60	5	6	FB7 & FB8	C56
1	7	FB7 & FB8	C59	5	7	FB9 & FB10	C59
1	8	FB3 & FB4	C58	5	8	FB11 & FB12	C60
				5	9	FB9 & FB10	C60
2	1	FB7 & FB8	C57	5	10	FB11 & FB12	C59
2	2	FB13 & FB14	C56	5	11	FB9 & FB10	C58
2	3	FB5 & FB6	C56	5	12	FB7 & FB8	C58
2	4	FB15 & FB16	C57				
2	5	FB5 & FB6	C58	6	1	FB15 & FB16	C55
2	6	FB13 & FB14	C60	6	2	FB15 & FB16	C56
2	7	FB7 & FB8	C60	6	3	FB13 & FB14	C54
2	8	FB13 & FB14	C58	6	4	FB17 & FB18	C57
				6	5	FB15 & FB16	C59
3	1	FB13 & FB14	C55	6	6	FB15 & FB16	C60
3	2	FB9 & FB10	C54	6	7	FB17 & FB18	C59
3	3	FB11 & FB12	C57	6	8	FB15 & FB16	C58
3	4	FB13 & FB14	C57				
3	5	FB13 & FB14	C59	7	1	FB1 & FB2	C56
3	6	FB11 & FB12	C54	7	2	FB17 & FB18	C55
3	7	FB11 & FB12	C58	7	3	FB5 & FB6	C57
3	8	FB11 & FB12	C56	7	4	FB17 & FB18	C56
				7	5	FB1 & FB2	C58
4	1	FB3 & FB4	C54	7	6	FB17 & FB18	C60
4	2	FB1 & FB2	C55	7	7	FB3 & FB4	C60
4	3	FB1 & FB2	C54	7	8	FB17 & FB18	C58
4	4	FB3 & FB4	C57				
4	5	FB3 & FB4	C59	8	1	FB13 & FB14	C61
4	6	FB1 & FB2	C60	8	2	FB11 & FB12	C61
4	7	FB1 & FB2	C59	8	3	FB9 & FB10	C61
4	8	FB1 & FB2	C57	8	4	FB7 & FB8	C61
				8	5	FB5 & FB6	C61
				8	6	FB3 & FB4	C61
				8	7	FB1 & FB2	C61
				8	8	FB15 & FB16	C61

C57, FB9 & FB10 are spare CRDM fuse blocks.

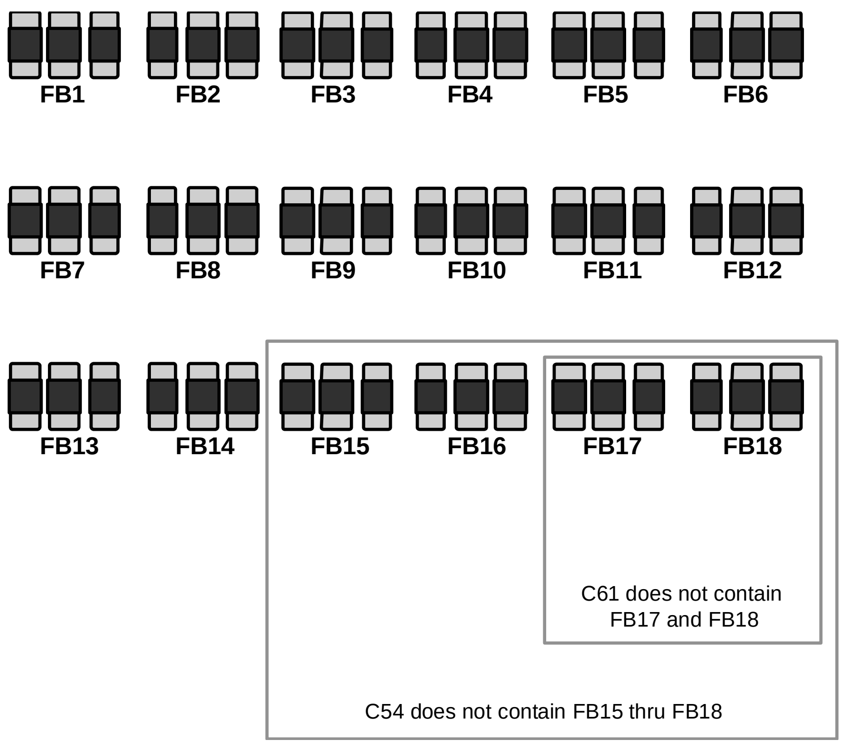
EXHIBIT A
1203.003

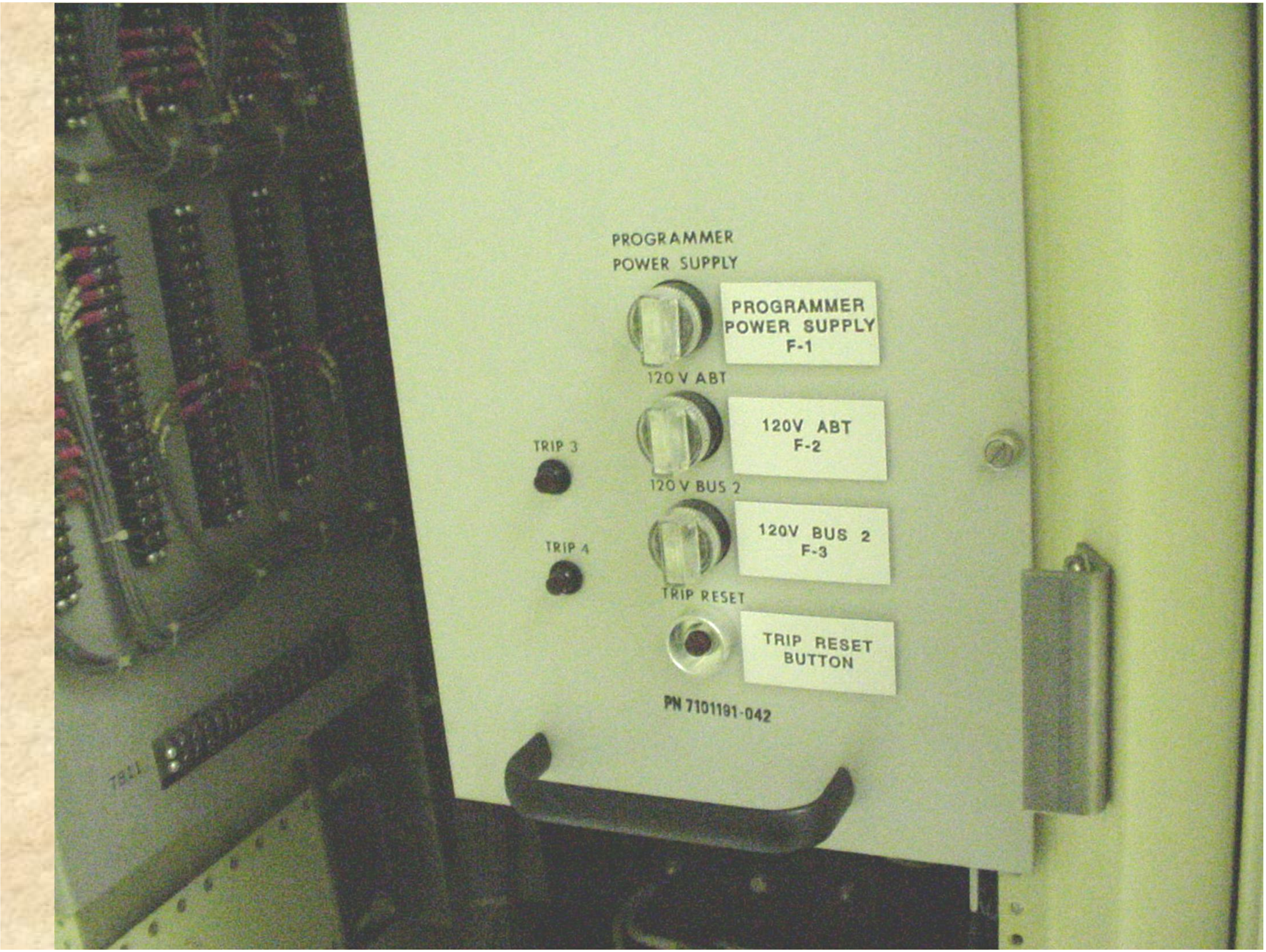
Page 2 of 2

CONTROL ROD STATOR FUSE LOCATION REFERENCE

Revised 4/11/95

Arrangement of Fuses in
Cabinets C54 through C61




PROGRAMMER
POWER SUPPLY
PROGRAMMER
POWER SUPPLY
F-1
120 V ABT
120V ABT
F-2
TRIP 3
120 V BUS 2
120V BUS 2
F-3
TRIP 4
TRIP RESET
TRIP RESET
BUTTON
PN 7101191-042

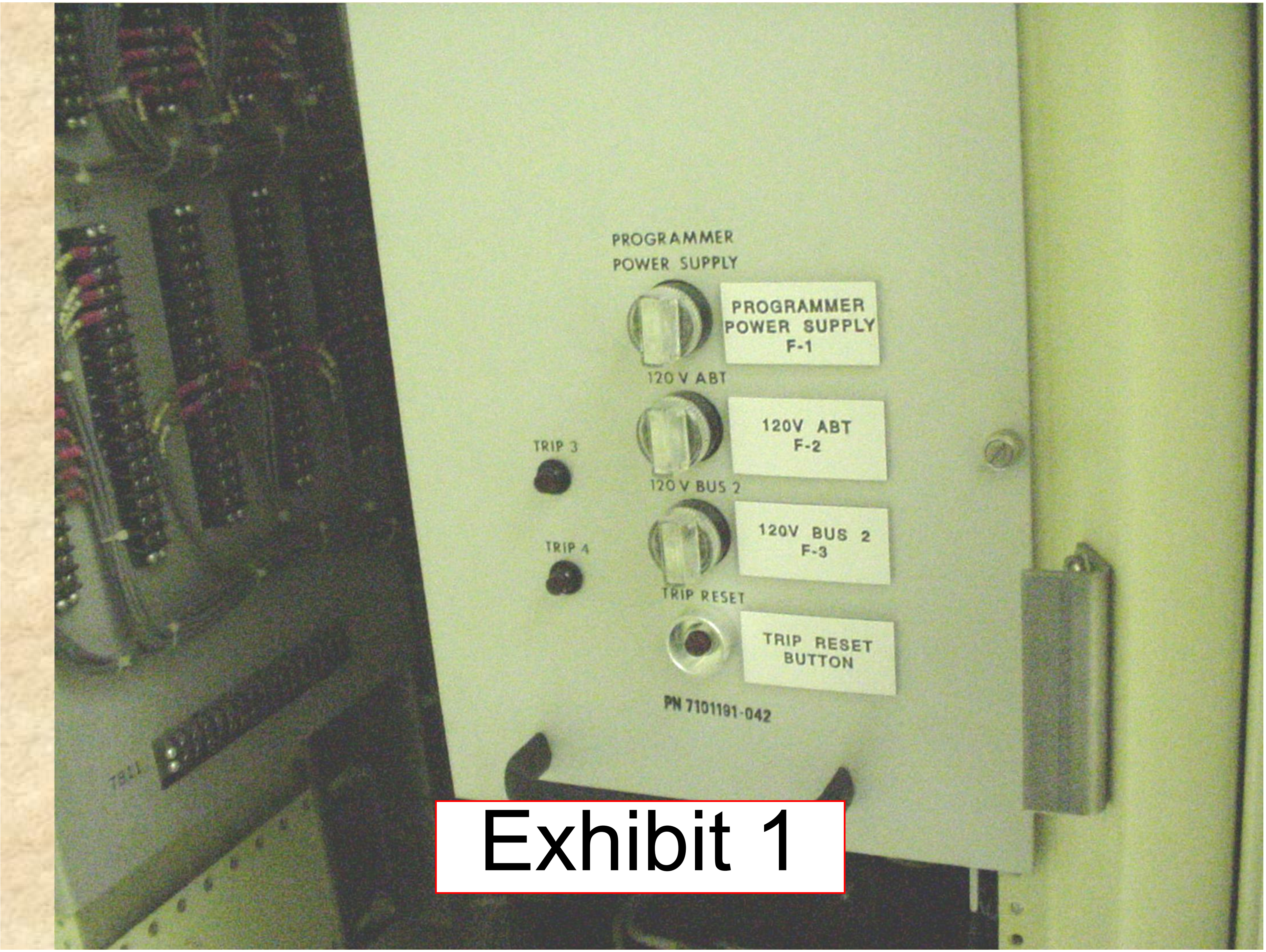
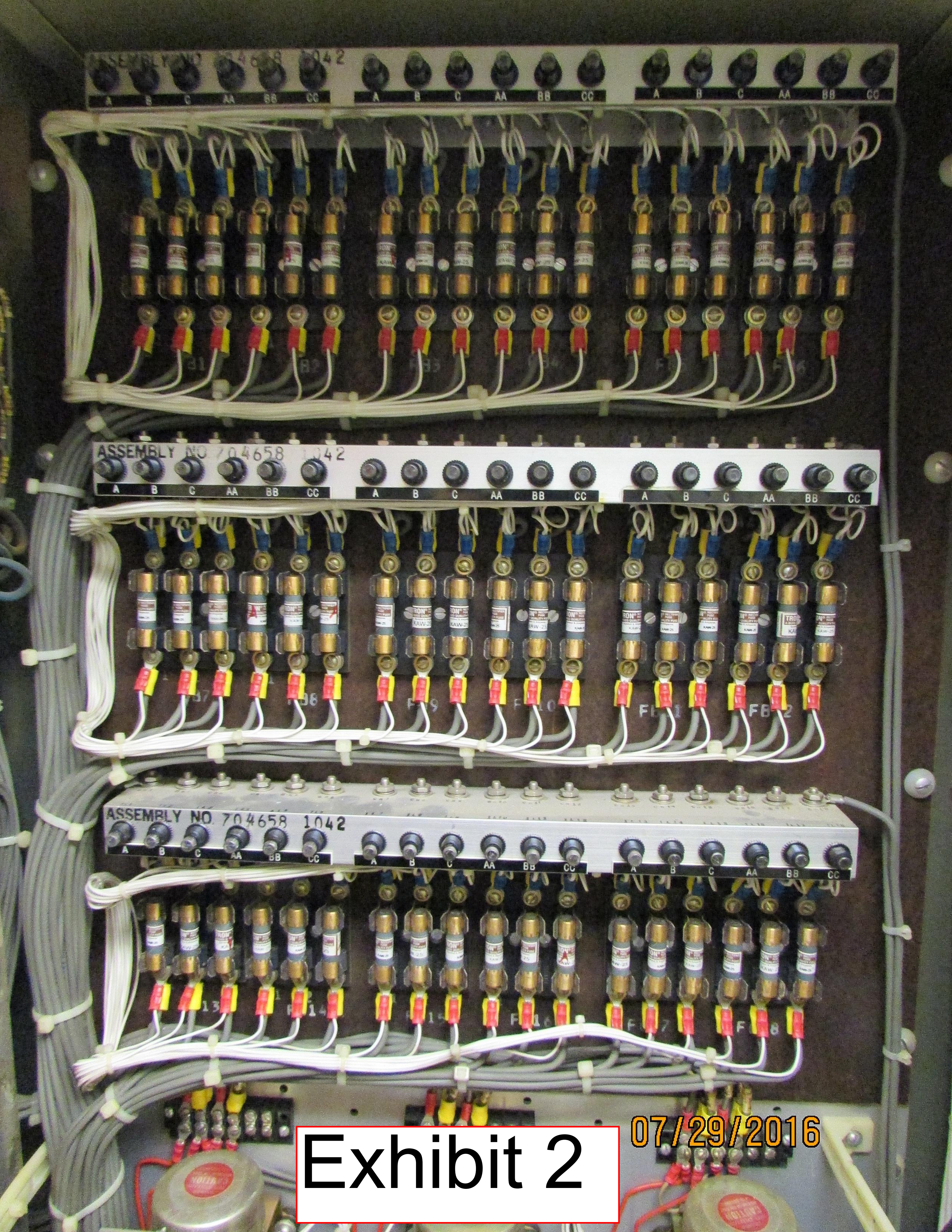

PROGRAMMER
POWER SUPPLY
PROGRAMMER
POWER SUPPLY
F-1
120 V ABT
120V ABT
F-2
TRIP 3
120 V BUS 2
120V BUS 2
F-3
TRIP 4
TRIP RESET
TRIP RESET
BUTTON
PN 7101191-042

Exhibit 1


ASSEMBLY NO. 704658 1042
A
B
C
AA
BB
CC
07/29/2016
Exhibit 2

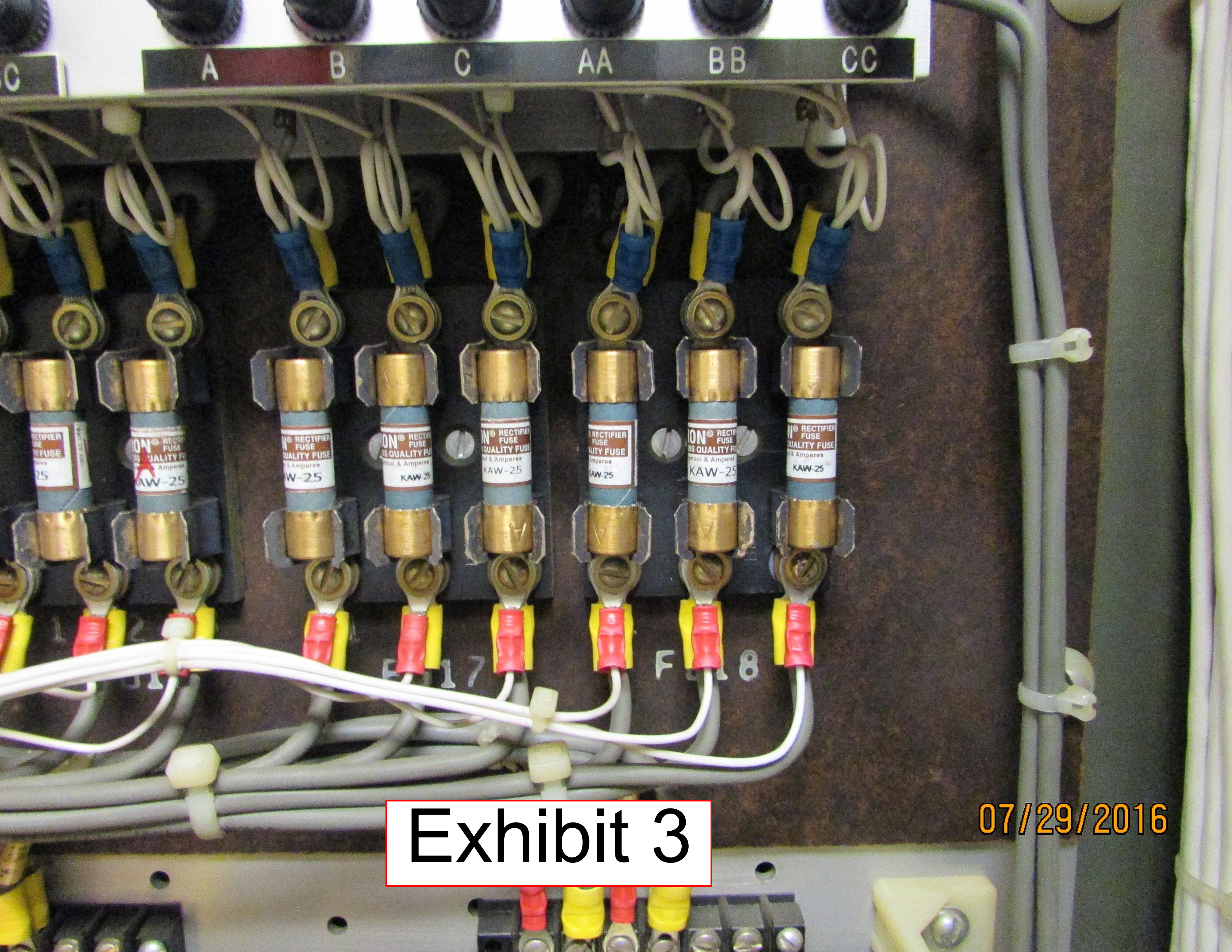


Exhibit 3

Unit 1 2016 NRC Exam

In-plant JPM

P3

JOB PERFORMANCE MEASURE

Unit: 1 Rev # 3 Date: 8/3/16

JPM ID: A1JPM-RO-LRW02 (P3)

System/Duty Area: Liquid Radwaste System

Task: Perform Sampling TWMT (T-16A/B)

JTA# ANO1-WCO-CZ-NORM-25

KA Value RO 2.7 SRO 2.8 KA Reference: 068 A2.02

Approved For Administration To: RO X SRO X

Task Location: Inside CR ______ Outside CR X Both ______

Suggested Testing Environment and Method (Perform or Simulate):

Plant Site: Simulate Simulator: ______ Lab: ______

Position Evaluated: RO: ______ SRO: ______

Actual Testing Environment: Plant Site ______ Simulator ______ Lab ______

Testing Method: Simulate: X Perform: Alternate Path: X

Approximate Completion Time in Minutes: 5 Minutes

Reference(s): OP-1104.020, CLEAN WASTE SYSTEM OPERATION

Examinee's Name: ______ Logon ID: ______

Evaluator's Name: ______

The Examinee's performance was evaluated against the standards contained in this JPM and is determined to be:

Satisfactory: ______ Unsatisfactory: ______

Performance Checklist Comments:

Start Time ______ Stop Time ______ Total Time ______

*Signed ______ Date ______

*Signature indicates this JPM has been compared to its applicable procedure by a qualified individual (not the examinee) and is current with that revision.

JPM ID: A1JPM-RO-LRW02

THE EXAMINER SHALL REVIEW THE FOLLOWING WITH THE EXAMINEE:

The examiner shall ensure that the examinee has been briefed on the JPM Examination Briefing Sheet EN-TQ-114 Attachment 9.5 or NUREG 1021 Appendix E.

JPM INITIAL TASK CONDITIONS:

Unit 1 is at 100% power.
RI-4642 is INOPERABLE
P-3A, B, and C Circulating Water Pumps are running.
P-3D Circulating Water Pump is idle.
Average CW discharge pressure is 3.8 psig
T-16A level is 85% by local indication and is no longer filling.

TASK STANDARD:

Applicant aligned T-16A for sample and then secured P-47A after sample was obtained.

TASK PERFORMANCE AIDS:

OP-1104.020 Section 18.0 Sampling Treated Waste Monitor Tank T-16A.

This is an alternate path JPM

Revision Notes: Rev. 2 made this an alternate path JPM, Rev. 1 is up to date (on 7/29/16) if a non-alternate path JPM is desired.

JPM ID: A1JPM-RO-LRW02

INITIATING CUE: CRS directs you to perform “Sampling Treated Waste Monitor Tank T-16A” Section 18.0 of 1104.020.

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
	18.1. Verify closed Treated Waste Monitor T-16A Inlet (CZ-47A). **<u>POSITIVE CUE:</u>** **CZ-47A chain operated in the clockwise direction and did not move. No valve stem visible and limit switch engaged.**	CZ-47A verified closed.	___	___	___
	18.1.1 Install Sample Tag on Treated Waste Monitor T-16A Inlet (CZ-47A) **<u>EXAMINER CUE:</u>** **Tag installed through the chain operator such that the valve cannot be operated without removing the tag.**	Tag installed through the chain operator such that the valve cannot be operated without removing the tag.	___	___	___
	18.2 Verify Suction Crossover on Treated Waste Monitor Pumps (CZ-50) closed. **<u>POSITIVE CUE:</u>** **CZ-50 handwheel operated in the clockwise direction and did not move. Valve stem is in the “full in” position.**	CZ-50 Verified Closed	___	___	___
	Place Treated Waste Monitor Tank T-16A on short path recirc as follows:				
	18.3.1 Verify Treated Waste Discharge Valve to Header from P-47A (CZ-55) closed. **<u>POSITIVE CUE:</u>** **CZ-55 handwheel operated in the clockwise direction and did not move. Valve stem is in the “full in” position.**	CZ-55 Verified Closed.	___	___	___

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
(C)	18.3.2 Open Treated Waste Monitor Tank T-16A Recirc Inlet (CZ-54A) **<u>POSITIVE CUE:</u>** **CZ-54A handwheel operated in the counter clockwise direction until it stopped. Valve stem is in the "full out" position.**	CZ-54A Verified Open.	___	___	___
(C)	18.3.3 Start Treated Waste Monitor Pump (P-47A) using one of the following handswitches: • HS-4627 remote handswitch on Clean Liquid Radwaste Control Panel (C112) • HS-4637 local handswitch **<u>POSITIVE CUE:</u>** **Red light ON, Green light OFF for P-47A and 40 psig discharge pressure indicated on PI-4627.** <u>NEGATIVE CUE:</u> Green light ON, Red light OFF for P-47A.	P-47A started	___	___	___
	18.4 Complete Section 1.0, "Request", of Attachment B1, Treated Waste Monitor Tank T-16A Liquid Release Permit. **<u>EXAMINER CUE:</u>** **Inform applicant that Section 1.0 of Attachment B1 is filled in. (Don't need to watch them fill it in.)**	Applicant referred to T-16A Liquid Release Permit and wsa informed it is filled in.	___	___	___
	18.5 Submit Attachment B1 to Chemistry for section 2.0, "Analysis". **<u>EXAMINER CUE:</u>** **Chemistry reports sampling and neutralizing operations are complete.**	Applicant should state that he would take the Attachment B1 to Chemistry.	___	___	___

(C)	PERFORMANCE CHECKLIST	STANDARD	SAT	UN SAT	N/A
<u>EXAMINER NOTE</u>: ALTERNATE PATH BEGINS HERE					
	18.6 <u>WHEN</u> sampling and neutralizing operations are complete, <u>THEN</u> perform the following: No Cue given	Applicant should proceed with next step.	___	___	___
<u>EXAMINER NOTE:</u> Applicant should attempt to stop P-47A using HS-4637 local hand switch first, which will not work. HS-4627 on C112 will successfully stop pump. If applicant chooses to operate HS-4627 first, swap success paths such that the second switch operated is the one that works.					
	18.6.1 Stop P-47A using ONE of the following: • HS-4627 on Clean Liquid Radwaste Control Panel (C112) • HS-4637 local handswitch **<u>NEGATIVE CUE:</u>** **When applicant describes stopping P-47A inform him that,** **Red light ON, Green light OFF for P-47A and 40 psig discharge pressure indicated on PI-4627.**	P-47A handswitch taken to the stop position. When he realizes that the pump failed to stop proceed to the other handswitch.	___	___	___
(C)	18.6.1 Stop P-47A using ONE of the following: • HS-4627 on Clean Liquid Radwaste Control Panel (C112) • HS-4637 local handswitch **<u>POSITIVE CUE:</u>** **Red light OFF, Green light ON for P-47A and no flow indicated on FI-4626 or 0 psig indicated on PI-4627.**	P-47A handswitch taken to the stop position. When he realizes that the pump failed to stop proceed to the other handswitch.	___	___	___
<u>EXAMINER CUE</u>: Inform applicant JPM Complete.					

END

JPM ID: A1JPM-RO-LRW02

INITIAL CONDITIONS:

Unit 1 is at 100% power.
RI-4642 is INOPERABLE
P-3A, B, and C Circulating Water Pumps are running.
P-3D Circulating Water Pump is idle.
Average CW discharge pressure is 3.8 psig
T-16A level is 85% by local indication and is no longer filling.

INITIATING CUE:

CRS directs you to:
Perform “Sampling Treated Waste Monitor Tank T-16A” Section 18.0 of 1104.020.

18.0 Sampling Treated Waste Monitor Tank T-16A

CRITICAL STEP

18.1 Verify closed Treated Waste Monitor T-16A Inlet (CZ-47A).

18.1.1 Install Sample Tag on Treated Waste Monitor T-16A Inlet (CZ-47A).

18.2 Verify Suction Crossover on Treated Waste Monitor Pumps (CZ-50) closed.

18.3 Place Treated Waste Monitor Tank T-16A on short path recirc as follows:

18.3.1 Verify Treated Waste Discharge Valve to Header from P-47A (CZ-55A) closed.

18.3.2 Open Treated Waste Monitor Tank T-16A Recirc Inlet (CZ-54A).

18.3.3 Start Treated Waste Monitor Pump (P-47A) using one of the following handswitches:

- HS-4627 remote handswitch on Clean Liquid Radwaste Control Panel (C112)
- HS-4637 local handswitch

18.4 Complete Section 1.0, "Request", of Attachment B1, Treated Waste Monitor Tank T-16A Liquid Release Permit.

18.5 Submit Attachment B1 to Chemistry for section 2.0, "Analysis".

Chemist ____________________________

18.6 <u>WHEN</u> sampling and neutralizing operations are complete, <u>THEN</u> perform the following:

18.6.1 Stop Treated Waste Monitor Pump (P-47A) using one of the following handswitches:

- HS-4627 remote handswitch on Clean Liquid Radwaste Control Panel (C112)
- HS-4637 local handswitch

18.6.2 Close Treated Waste Monitor Tank T-16A Recirc Inlet (CZ-54A).

ATTACHMENT B1

TREATED WASTE MONITOR TANK
T-16A LIQUID RELEASE PERMIT

PERMIT #____________________(Assigned by Chemistry) ______________
Date

1.0 REQUEST (Operations)

1.1 Treated Waste Monitor Tank (T-16A) taken out of service and placed on recirc for sampling and release:

Date __________ Time _________.

NOTE
Sample Tag contains information to remind personnel that tank is isolated for chemistry sample.

1.2 Verify Treated Waste Monitor T-16A Inlet (CZ-47A) closed.

1.2.1 Verify Sample Tag installed on handwheel OR chain operator.

1.3 Initial Treated Waste Monitor Tank (T-16A) level _________________%.

1.3.1 Circle indication used:

Local Remote

1.4 IF Liquid Radwaste Process Monitor (RI-4642) is available, THEN perform the following:

1.4.1 Check Liquid Radwaste Process Monitor (RI-4642) operability status by performing one of the following:

A. IF monitor count rate is ≤ 1000 cpm, THEN perform the following:

1. Verify no Liquid Release in progress using Discharge Flow to Flume (FI-4642).

2. Select "Check Source" on Liquid Radwaste Process Monitor AND check that the monitor responds to check source with a count rate rise >100 cpm.

B. IF monitor count rate >1000 cpm, THEN check that count rate is <4.22E6 cpm.

1.4.2 IF Liquid Radwaste Process Monitor (RI-4642) is operable, THEN record Liquid Radwaste Process Monitor (RI-4642) background counts AND continue. ___________ cpm

A. Record Liquid Radwaste Process Monitor (RI-4642) initial setpoint: ________________ cpm

1.4.3 IF Liquid Radwaste Process Monitor (RI-4642) is inoperable, THEN notify Chemistry AND continue.

1.5 Record the following:

- Number of Circ Water Pumps running ____
- Circ Water pump Disch Press _______ psig

1.6 Submitted to Chemistry for Analysis, Section 2.0:

Date _______________ Time _____________

Section 1.0 Performed By ____

2.0 ANALYSIS (Chemistry)

2.1 Sample Treated Waste Monitor Tank (T-16A) for release analysis using Sampling Treated Waste Monitor Tank (T-16A/B) (1607.009).

Date/Time___________/__________

2.2 IF Liquid Radwaste Process Monitor (RI-4642) is inoperable
OR unavailable as identified in either "Request", or "Verification of Pre-Release Requirements" sections of this permit,
THEN obtain independent sample of tank contents for analysis.

Date/Time___________/__________

Chemistry______________________

2.3 Record selected tank pH ____________.

2.4 Review gamma spectroscopy report and Tritium analysis.

2.5 IF release is radioactive
AND release desired,
THEN generate Preliminary Release Report.

2.6 Check sample results indicate that release of total tank contents will not violate ANO radioactive effluent discharge limit.

2.7 IF Liquid Radwaste Process Monitor (RI-4642) is inoperable
OR unavailable as identified in either "Request", or "Verification of Pre-Release Requirements" section of this permit,
THEN perform independent analysis of computer data input.

Date/Time___________/__________

Chemistry______________________

ATTACHMENT B1

2.8 IF pH is NOT between 6.0 and 9.0,
THEN perform the following:

2.8.1 Adjust per Sampling Treated Waste Monitor Tank (T-16A/B) (1607.009).

2.8.2 Treated Waste Monitor Tank (T-16A) post-neutralization pH ______.

2.8.3 IF pH is NOT between 6.0 and 9.0,
THEN re-perform adjustment and analysis sequence until pH is between 6.0 and 9.0.

2.9 Preliminary Release Report and/or Permit returned to Control Room.

Performed by________________________ Date/Time___________/__________

3.0 Verification of Pre-Release Requirements (Operations)

NOTE

If adjustments are made to Circ Water flow, then the release permit calculations are inaccurate and the release must be terminated.

3.1 Check Circ Water flow/configuration recorded in initial release submittal data is still valid.

3.2 Verify appropriate signatures on the Open EMS Liquid Permit Pre-Release Data Report.

3.3 Obtain CRS/SM approval to proceed with release.

CRS/SM ___________________________________

3.4 Provide a copy of the Monitor Setpoints section from Open EMS Liquid Permit Pre-Release Data Report to Control Room Operators.

3.5 IF Liquid Radwaste Process Monitor (RI-4642) is operable AND available, THEN verify proper operation of radiation monitor and interlocks as follows (ODCM S2.1.1.4):

3.5.1 Check Liquid Radwaste Process Monitor (RI-4642) available by one of the following methods:

- IF monitor count rate is ≤ 1000 cpm, THEN select CHECK SOURCE on Liquid Radwaste Process Monitor (RI-4642) and check that the monitor responds to check source with a count rate rise >100 cpm.

- IF monitor count rate >1000 cpm, THEN check that count rate is <4.22E6.

3.5.2 Verify the following valves closed:

- FWMT Disch to CW Flumes (DZ-25)

- LZ Drain Pump P-45 Discharge to Flume (LZ-5)

- Treated Waste Discharge to Circ Water Flume (CZ-58)

3.5.3 Place Liquid Waste Dump to Flume CV-4642 handswitch (HS-4642) to OPEN.

3.5.4 Verify CZ Disch to Flume Flow Controller (FIC-4642) in Manual.

3.5.5 Fully open Liquid Waste Dump to Flume (CV-4642) by turning CZ Disch to Flume Flow Controller (FIC-4642) Manual Adjust knob clockwise.

3.5.6 Lower Liquid Radwaste Process Monitor (RI-4642) alarm setpoint until HIGH RAD alarm actuates.

3.5.7 Check that Liquid Waste Dump to Flume (CV-4642) indicating lights show CV-4642 tripped closed.

3.5.8 Place Liquid Waste Dump to Flume CV-4642 handswitch (HS-4642) to CLOSED position.

A. Turn CZ Disch to Flume Flow Controller (FIC-4642) Manual Adjust knob fully counter-clockwise to the closed position.

3.5.9 Adjust Liquid Radwaste Process Monitor (RI-4642) setpoint to the value listed in the Monitor Setpoints section of Liquid Permit Pre-Release Data Report for total Circ Water flow. (Round setpoint down for conservatism).

3.5.10 Verify a Licensed Operator, other than individual who initially set Liquid Radwaste Process Monitor (RI-4642) setpoint, has independently verified that Liquid Radwaste Process Monitor (RI-4642) setpoint is correct for total circ water flow.

3.5.11 Reset Liquid Radwaste Process Monitor (RI-4642) HIGH RAD alarm by taking HS to ALARM RESET and releasing.

3.6 <u>IF</u> Liquid Radwaste Process Monitor (RI-4642) is inoperable <u>OR</u> unavailable,
<u>THEN</u> verify requirements specified in "Analysis" section of this permit for Liquid Radwaste Process Monitor (RI-4642) inoperable OR unavailable have been performed.

Section 3.0 Performed By ____

4.0 Release (Operations)

CAUTION
Unauthorized discharge to Lake Dardanelle via the flume shall be avoided.

4.1 Verify Liquid Waste Dump to Flume (CV-4642) closed.

4.2 Verify Treated Waste Monitor Pump (P-47A) stopped.

- HS-4627 remote handswitch on Clean Liquid Radwaste Control Panel (C112)
- HS-4637 local handswitch

NOTE
Sample Tag contains information to remind personnel that tank is isolated for chemistry sample.

4.3 Verify Treated Waste Monitor Tank T-16A Inlet (CZ-47A) closed AND Sample Tag installed.

4.3.1 IF Sample Tag is missing
OR has been removed since tank was last sampled,
THEN perform the following:

A. Terminate this release.

B. Install Sample Tag on Treated Waste Monitor T-16A Inlet (CZ-47A).

C. Submit new release permit to Chemistry.

4.4 Verify Treated Waste Monitor Tank T-16A Outlet (CZ-48A) open.

4.5 Verify Liquid Radwaste Disch Filter (F-560) in-service by performing the following:

4.5.1 Verify the following valves open:

- LRW Disch Filter F-560 Inlet (CZ-74)
- LRW Disch Filter F-560 Outlet (CZ-77)

4.5.2 Verify LRW Disch Filter F-560 Bypass (CZ-83) closed.

4.6 Verify Treated Waste Discharge Valve to Header from P-47B (CZ-55B) closed.

4.7 Verify Treated Waste Monitor Tank T-16A Recirc Inlet (CZ-54A) closed.

4.8 Open Treated Waste Discharge Valve to Header from P-47A (CZ-55A).

4.9 Open Treated Waste Discharge to Circ Water Flume (CZ-58).

4.10 Verify Treated Waste Monitor Pump Discharge to Clean Waste Tanks (CZ-57) closed.

4.11 Verify Unit 1/Unit 2 Liquid Radwaste Manifold Isol (CZ-87) closed.

4.12 Verify Suction Crossover on Treated Waste Monitor Pumps (CZ-50) closed.

4.13 IF Liquid Radwaste Process Monitor (RI-4642) is inoperable
OR unavailable,
THEN perform the following (ODCM L2.1.1 A):

4.13.1 Verify FWMT Disch to CW Flumes (DZ-25) closed.

4.13.2 Verify LZ Drain Pump P-45 Discharge to Flume (LZ-5) closed.

4.13.3 Person qualified as Waste Control Operator, independently verify release path valve alignment prior to release (ODCM L2.1.1 A.2.2.3).

Verified by ______________________

4.14 Notify Control Room of intent to begin release.

4.15 Commence Treated Waste Monitor Tank (T-16A) release as follows:

4.15.1 Start Treated Waste Monitor Pump (P-47A) using one of the following handswitches:

- HS-4627 remote handswitch on Clean Liquid Radwaste Control Panel (C112)
- HS-4637 local handswitch

4.15.2 Place Liquid Waste Dump to Flume (CV-4642) handswitch to OPEN.

CAUTION

Use of flow rate greater than allowable by the release permit may violate ODCM limits for release and may be NRC reportable.

NOTE

Allowable Release Flow Rate is listed in the "Max Waste (GPM)" column of the Preliminary Report.

4.15.3 Note Max Flow rate from Preliminary Report (______gpm).

4.15.4 Open/throttle open Liquid Waste Dump to Flume (CV-4642) by turning CZ Disch to Flume Flow Controller (FIC-4642) Manual Adjust knob clockwise to commence release, while NOT exceeding Max Flow rate entered in step 4.15.3.

4.16 WHEN release has started,
THEN perform the following:

4.16.1 Perform one of the following:

- IF Discharge Flow to Flume (FI-4642) is operable,
  THEN Control Room personnel shall observe Discharge Flow to Flume (FI-4642) AND verify release flow rate is $\leq$ allowable release flow rate for total circ water flow. (Ref. ODCM S2.1.1.1)

- IF Discharge Flow to Flume (FI-4642) is inoperable,
  THEN release may continue provided:

  – Estimate flow rate at least once every four hours during release.

  – Refer to ODCM L2.1.1 B.

  – Document occurrence with a Condition Report.

NOTE

If a Plant Computer tabular Log (DUMP) is used instead of Process Radiation Monitoring Effluent Recorder (RR-4830), then the tabular log shall contain at least points R4642, R3618 and be set at $\leq$ 5 minute intervals and cover the duration of the release.

4.16.2 IF Process Radiation Monitoring Effluent Recorder (RR-4830) is available,
THEN verify the following data recorded on Process Radiation Monitoring Effluent Recorder (RR-4830).
OTHERWISE verify Plant Computer tabular log is activated and record data on it.

A. Release start time ________ Date ________

B. Release permit number ________________

C. Name and number of tank being released: "Treated Waste Monitor Tank (T-16A)"

4.16.3 Notify RP technician that Treated Waste Monitor Tank (T-16A) release has started and Liquid Radwaste Disch Filter (F-560) should be periodically monitored for rad levels.

4.16.4 Notify Chemistry that Treated Waste Monitor Tank (T-16A) release has started.

CAUTION

Pumping radioactive liquid tanks empty can cause sediment in bottom of tank to be deposited in discharge piping. This can produce higher radiation areas in the vicinity of the discharge piping than previously existed.

4.17 Check Treated Waste Monitor Tanks (T-16A/B) levels AND verify only Treated Waste Monitor Tank (T-16A) is being released.

NOTE

Liquid Radwaste Disch Filter (F-560) inlet press should not exceed 25 psig.

4.17.1 Monitor Liquid Radwaste Disch Filter (F-560) during release for a rise in inlet pressure.

4.17.2 IF LRW Disch Filter F-560 Inlet Press (PI-4606) >25 psig,
THEN perform the following:

A. Stop Treated Waste Monitor Pump (P-47A) using one of the following handswitches:

- HS-4627 remote handswitch on Clean Liquid Radwaste Control Panel (C112)
- HS-4637 local handswitch

B. Place Liquid Waste Dump to Flume (CV-4642) handswitch to Close.

C. Perform "Backflushing the Liquid Radwaste Discharge Filter (F-560)" section of this procedure.

D. WHEN backflush is complete,
THEN recommence release at step 4.15 of this attachment.

NOTE

OP-1203.007 “Liquid Waste Discharge Line High Radiation” directs the re-establishing of the liquid release if process monitor trips due to a confirmed instantaneous spike.

4.17.3 IF Liquid Radwaste Process Monitor (RI-4642) trips due to an instantaneous spike,
THEN perform the following:

A. Stop Treated Waste Monitor Pump (P-47A) using one of the following handswitches:

- HS-4627 remote handswitch on Clean Liquid Radwaste Control Panel (C112)
- HS-4637 local handswitch

B. Verify Liquid Radwaste Process Monitor (RI-4642) reset.

C. Notify Control Room of intent to recommence release.

D. Recommence release by returning to step 4.15.

4.18 WHEN release is complete,
THEN perform the following:

4.18.1 Perform one of the following to verify Treated Waste Monitor Pump (P-47A) stopped:

- HS-4627 remote handswitch on Clean Liquid Radwaste Control Panel (C112) in normal-after-stop
- Local indication pump stopped at HS-4637

4.18.2 Verify discharge flow ~zero gpm.

4.18.3 Notify RP technician that Treated Waste Monitor Tank (T-16A) release is complete AND that Liquid Radwaste Disch Filter (F-560) should be surveyed for rad levels to determine the need to back flush Liquid Radwaste Disch Filter (F-560).

4.18.4 Back flush Liquid Radwaste Disch Filter (F-560) as necessary per Radiation Protection survey.

4.19 Notify control room that Treated Waste Monitor Tank (T-16A) release is complete.

4.20 IF Process Radiation Monitoring Effluent Recorder (RR-4830) is available,
THEN record the following data on Process Radiation Monitoring Effluent Recorder (RR-4830).
OTHERWISE record on Plant Computer tabular logsheets.

- Release stop time __________ Date _________
- Release permit number _____________

4.21 Flush clean waste to discharge flume piping as follows:

4.21.1 Verify Liquid Waste Dump to Flume CV-4642 open.

4.21.2 Close Treated Waste Discharge Valve to Header from P-47A (CZ-55A)

4.21.3 Close Treated Waste Discharge to Circ Water Flume (CZ-58).

4.21.4 Align demineralized water to discharge piping by opening Condensate Flush Disch Hdr (CS-256).

4.21.5 WHEN piping flushed 4-5 minutes,
THEN close Condensate Flush to Disch Header (CS-256).

4.22 Place Liquid Waste Dump to Flume CV-4642 handswitch (HS-4642) to CLOSE.

4.22.1 Check Liquid Waste Dump to Flume (CV-4642) indicating lights show valve closed.

4.23 Verify CZ Disch to Flume Flow Controller (FIC-4642) in manual.

4.24 Turn CZ Disch to Flume Flow Controller (FIC-4642) Manual Adjust knob fully counter-clockwise to the CLOSED position.

4.25 IF HS-4637 used to stop Treated Waste Monitor Pump (P-47A),
THEN verify HS-4627 remote handswitch on Clean Liquid Radwaste Control Panel (C112) in normal-after-stop.

4.26 Record final Treated Waste Monitor Tank (T-16A) level ________%

4.27 Remove Sample Tag from Treated Waste Monitor T-16A Inlet (CZ-47A).

4.28 Inform control room that Liquid Radwaste Process Monitor (RI-4642) setpoint may be returned to the value listed in step 1.4.2.

4.29 Return release permit with all attachments to CRS/SM.

Performed by ____________________________________ Date ______________

Reviewed by CRS/SM ______________________________ Date ______________

4.30 Return the following to Chemistry:

- This attachment
- Release permit
- Tabular logsheets, if used.

Facility: **ANO-1** Scenario No.: **1** Op-Test No.: **2016-1**

Examiners: ______ Operators: ______

Initial Conditions: **5% power**.

Turnover: **5% power, Place "A" MFW Pump in service and raise power to 10%.**
P-3D Circulating Water Pump OOS for maintenance

Event No.	Position	Event Type*	Event Description
1	BOP	N	Place A MFW Pump in service
2	ATC	R	Raise power to 10%
3	ATC SRO	I TS	Pressurizer level fails high. (LT-1001)
4	BOP SRO	I TS	Inadvertent ES Digital Channel 7 Actuation
5	BOP	C	Loss of 480 V Load Center B3 with a failure of C-5B to auto start
6	ATC	C	Continuous Control Rod Motion
7		M	Pressurizer steam space leak
8	ATC	I CT	Failure of ES Channels 1 and 2 to automatically actuate
9	ATC	C CT	RPS fails to trip and **ALL** RX trip pushbuttons fail.
10	BOP	CT	Trip all RCPs within 2 minutes of a LOSM

*(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS) Technical Specification, (CT) Critical Task

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Malfunctions after EOP entry (1-2)	2
2. Abnormal events (2-4)	4
3. Major transients (1–2)	1
4. EOPs entered/requiring substantive actions (1–2)	2
5. EOP contingencies requiring substantive actions (0-2)	1
6. EOP based Critical tasks (2–3)	3

NARRATIVE:
Scenario starts with plant power at <5%. During turnover the ATC will be directed to maintain reactor power between 4 – 5% while the BOP places the A MFW Pump into service. This will be completed with no malfunctions.

After the MFW Pump is placed into service and power is raised to MODE 1, LT-1001 – Pressurizer Level Transmitter will fail high causing two alarms (Hi Level and Hi HI Level) and results in the RCS Makeup Valve being demanded closed due to the false high level. The ATC / BOP will determine which transmitter has failed and the ATC will select a good signal for pressurizer level control. The CRS will also enter T.S. 3.3.15 Condition A (PAM) for the failed transmitter.

Next, an inadvertent actuation of ESAS Digital Channel 7 will occur, which results in an automatic start of P-35A, Reactor Building Spray Pump, (after 35 seconds) and the opening of the Reactor Building Spray Isolation Valve CV-2401. The spray pump will be running with no suction source aligned if not overridden within the 35 second delay time. The BOP will override P-35A and stop the pump (if running) and override and close CV-2401. The CRS will enter T.S. 3.3.7 and possibly T.S. 3.6.5 if the spray pump ran without a suction source and the crew determines that possible damage to the pump occurred.

Next, a loss of the Non-Vital 480V Load Center (B3) will occur with a failure of C-5B, Condenser Vacuum Pump to automatically start. C-5B can be started manually from the control room. The AOP for loss of load center will have the crew check several components powered off the redundant load center in service. The only component that will not be running is C-5B.

During the power escalation to <10%, after entering MODE 1, a fault will occur that causes a continuous control rod motion. The CRS will enter OP-1203.003, Control Rod Drive Malfunction Actions, Section 9 for Continuous Control Rod Motion. The ATC will stop the failure by placing the diamond panel in the required configuration in accordance with the AOP. The actions may be performed prior to referencing the procedure.

The major event occurs next and is a Pressurizer Steam Space Leak that results in a LOSM and an ESAS actuation. The size of the leak will result in pressure stabilizing around 1200 psig. During the ESAS actuation Channel 2 (HPI) will fail to actuate. Both trains of HPI are required to regain adequate SCM for the given leak size. Therefore manual actuation of ES Channels 1 and 2 is a critical task. Additionally, RPS is failed and will not result in an automatic reactor trip, the backup pushbuttons are also failed so the ATC will manually insert control rods and dispatch an AO to manually open both of the CRD AC Power Supply Breakers in order to complete a reactor trip, this is also a critical task.

Critical Tasks

CT-24 Complete a Rx Trip on a failure of RPS – Dispatch outside operator to trip CRD Breakers within 1 minute of exceeding an RPS Automatic Trip Setpoint. (1800 psig)

CT-2 Initiate HPI on a loss of Subcooling margin – Complete the manual actuation of ESAS Channels 1 or 2 ~~prior to RCS press <1550 psig~~. ... prior to subcooling decreasing to zero.

CT-1 Trip all RCPs on a loss of Subcooling margin – Manually Trip all RCPs within 2 minutes of LOSM following the reactor trip and not before reactor is tripped.

LOSM – The definition of Loss of Subcooling Margin is dependent on RCS Pressure as can be seen in the table below

(This guidance is also in procedure OP-1203.013 - EOP Figures, Figure 1, Saturation and Adequate SCM):

RCS Pressure	Adequate SCM
>1000 psig	$\geq$30 ^{o}F
350 to 1000 psig	$\geq$50 ^{o}F
<350 psig	$\geq$70 ^{o}F

List of Initial Conditions and Triggers for Scenario 1

At Time	On Event	Action	Description
00:00:00	None	Insert malfunction RP246	REACTOR TRIP RELAY KE1 FAILS
00:00:00	None	Insert malfunction RP247	REACTOR TRIP RELAY KE2 FAILS
00:00:00	None	Insert malfunction RP248	REACTOR TRIP RELAY KE3 FAILS
00:00:00	None	Insert malfunction RP249	REACTOR TRIP RELAY KE4 FAILS
00:00:00	None	Insert override DI_PB0140 to FALSE	CRD POWER BRKR TRIP,PB-0140
00:00:00	None	Insert override DI_PB0141 to FALSE	CRD POWER SUPPLY BREAKER TRIP
00:00:00	None	Insert override DI_ICC0020 to FALSE	REACTOR TRIP,PB
00:00:00	None	Insert malfunction ES259	ESAS CHANNEL 1 FAILS TO ACTUATE
00:00:00	None	Insert malfunction ES260	ESAS CHANNEL 2 FAILS TO ACTUATE
00:00:00	None	Insert override DI_HS3637SP to TRUE	STOP,VAC PUMPS,C5B,HS-3637
00:00:00	None	Insert remote A210OP to DOWN	A210OP RACK DOWN A210 P3B CW PUMP
MODE 1	1	Insert malfunction RD269	UNCONTROLLED ROD WITHDRAWL
None	2	Insert malfunction TR049 to 320.00000 in 60	PZR LT1001 FAIL 0-320 IN H2O
None	3	Insert malfunction ES257	FALSE ACTUATION OF ESAS CHANNEL 7
None	4	Insert malfunction ED191	LOSS OF 480 V BUS B3
None	5	Insert malfunction RC045 to 0.10000 in 180	PZR STEAM SPACE LEAK 0-1 SQ. IN.
None	6	Insert remote TRPCRDBKRA to TRIP	CRDACBKRA CRD AC BREKAER FROM RPS A
None	6	Insert remote TRPCRDBKRB to TRIP	CRDACBKRB CRD AC BREKAER FROM RPS B
None	7	Delete override DI_HS3637SP to TRUE	STOP,VAC PUMPS,C5B,HS-3637
None	8	Delete malfunction ES257	FALSE ACTUATION OF ESAS CHANNEL 7
None	None	OPEN EVENT FILE FOR C5B OVERRIDE	

Anticipated Procedures Used in Scenario 1

Event 1
1. 1106.016, Condensate, Feedwater, and Steam System Operation, Section 15.0
2. 1102.002, Plant Startup, Attachment E

Event 2
1. 1102.002, Plant Startup, Section 17.0

Event 3
1. 1203.012H, ACA for K09-B3 and K09-D3
2. 1203.015, Pressurizer System Failures, Section 4
3. T.S. 3.3.15

Event 4
1. 1203.012J, ACA for K11-D2
2. 1203.053, Inadvertent ESAS Actuation, Attachment 7
3. T.S. 3.3.7
4. T.S. 3.6.5 (Possible depending on situation)

Event 5
1. 1203.012B, ACA for K02-C8
2. 1203.046, Loss of Loadcenter

Event 6
1. 1203.003, Control Rod Drive Malfunction, Section 9

Event 7
1. 1202.001, Reactor Trip
2. 1202.002, Loss of Subcooling Margin
3. 1202.012, Repetitive Tasks, RT-5
4. 1202.012, Repetitive Tasks, RT-10
5. 1202.012, Repetitive Tasks, RT-18
6. 1202.012, Repetitive Tasks, RT-14

Op-Test No.: **2016-1** Scenario No.: **1** Event No.: **1**

Event Description: **Place A MFW Pump in service per OP-1106.016 , Section 15.0 as directed in OP-1102.002, Section 17.0. While maintaining reactor power between 4 – 5%.**

Time	Position	Applicant's Actions or Behavior
T=0	BOP	Place A MFW Pump into service starting at Step 15.3
		NOTE Plant Computer points P2832, P2834 (for P-1A), P2833 and P2835 (for P-1B) have sufficient upper range and are preferred discharge pressure points to monitor.
	BOP	15.3 To verify MFWP is supplying feedwater, raise desired MFWP speed until associated Startup Control Valves or Low Load Control Valves start to close: • Startup Valve Loop A (CV-2623) • Low Load Valve Loop A (CV-2622) • Startup Valve Loop B (CV-2673) • Low Load Valve Loop B (CV-2672)
	BOP	15.4 Stop Aux Feedwater Pump (P-75).
EXAMINER NOTE: Only one channel of RPS is fully modeled.		
	BOP	15.5 Reset RPS trips per "Anticipatory Reactor Trip System (ARTS) Reset" Attachment E of Plant Startup (1102.002) for the first MFWP.
EXAMINER NOTE: The following steps are from ATTACHMENT E, ANTICIPATORY REACTOR TRIP SYSTEM (ARTS) RESET		
	BOP	1.0 WHEN first Main Feedwater Pump is placed into service, THEN perform the following to reset RPS ARTS trip:
		CAUTION Depressing TRIP switch will trip the channel even if feed pump trip function is bypassed.
EXAMINER NOTE: The following steps calls for concurrent verification, the examiner can simulate being that additional verifier.		

Op-Test No.: **2016-1** Scenario No.: **1** Event No.: **1**

Event Description: **Place A MFW Pump in service per OP-1106.016 , Section 15.0 as directed in OP-1102.002, Section 17.0. While maintaining reactor power between 4 – 5%.**

Time	Position	Applicant's Actions or Behavior
	BOP	1.1 In RPS Channel A Cabinet (C41) perform the following: 1.1.1 Obtain SRO/RO Concurrent Verification of steps in this subsection. 1.1.2 Depress "test" switch labeled "RESET" on contact buffer lower module for the started Main Feedwater Pump. 1.1.3 Verify two red lights on contact buffer change state (top comes ON, bottom goes OFF). 1.1.4 Verify white light "MFWP" "A" ("B") "TRIPPED" (for the started MFWP) goes DIM.
EXAMINER CUE: Only one channel of RPS is fully modeled, inform the applicant that the other 3 channels will be completed by the IA Booth Operator.		
	ATC	2.0 Perform independent verification of ARTS reset for first Main Feedwater Pump placed into service as follows: 2.1 In RPS Channel A Cabinet (C41), verify: 2.1.1 Contact buffer for the started Main Feedwater pump has top red light ON. 2.1.2 White light "MFWP A" ("B") "TRIPPED" (for the started Main Feedwater pump) is DIM.
EXAMINER NOTE: Only one channel of RPS is fully modeled, inform the applicant that the other 3 channels will be completed by the IA Booth Operator. The following steps are from OP-1106.016		
	CRS	15.6 Close Aux FW Pump Recirc to E-11A (FW-1).
BOOTH: IAO Reports that FW-1 is closed.		

Op-Test No.: **2016-1** Scenario No.: **1** Event No.: **1**

Event Description: **Place A MFW Pump in service per OP-1106.016 , Section 15.0 as directed in OP-1102.002, Section 17.0. While maintaining reactor power between 4 – 5%.**

Time	Position	Applicant's Actions or Behavior
	ATC / BOP	15.7 As plant power is raised, verify feedwater responds as follows: 15.7.1 WHEN feedwater flow >2000 gpm, THEN verify associated Feed Pump Recirc Valve closed: • P-1A Feed Pump Recirc Valve (CV-2874) • P-1B Feed Pump Recirc Valve (CV-2876)
	BOP	15.8 Adjust MFWP speed to maintain ≥70 psid across lowest FW Block Valve.
	BOP Directs Field Operator	15.9 IF MFWP P-1A was placed into service, THEN perform the following: …
BOOTH: IAO Acknowledges direction to perform Step 15.9, 15.10 and 15.11 of 1106.016.		
EXAMINER NOTE: This concludes the normal event of placing the MFW Pump into service		
Proceed to next event		

Op-Test No.: 2016-1 Scenario No.: 1 Event No.: 2

Event Description: **Begin Reactivity Event, raise reactor power to 10% at < or = 0.5% per minute.**

Time	Position	Applicant's Actions or Behavior
T=20		**NOTE** Reactor demand H/A station output follows actual neutron power when CRD station is in MANUAL.
	ATC	17.18 WHEN a MFP is in service, THEN begin reactor power escalation to ~7%.
EXAMINER NOTE: Steps 17.19 and 17.20 are field operations preparing for turbine startup and have already been completed.		
BOOTH: IAO Reports Steps 17.19 and 17.20 complete if asked.		
		NOTE During plant startup, RCS Lithium out of spec hours begin to accumulate 72 hours after entry into Mode 1, or upon reaching equilibrium xenon, whichever occurs first
	CRS	17.21 WHEN reactor power >5% (Mode 1), THEN perform the following: 17.21.1 Make a station log entry of entering Mode 1. 17.21.2 Make station log entry that RCS Lithium required to be in its control band within next 72 hours, or upon reaching equilibrium xenon (enter time required). 17.21.3 Make shift turnover sheet entry of time and date that Lithium required to be in spec. 17.21.4 IF desired, THEN Diamond Panel may be placed in AUTO.
BOOTH: Chemistry acknowledges that MODE 1 has been entered and the 72 hour time limit has started.		
		NOTE The following indicates RPS trip is armed for loss of MFWPs.
	ATC	17.22 Verify following annunciators clear at ~9% Rx power: • TRIP ON LOSS OF MFP BYPASSED (K08-F4) • REACTOR TRIP ON LOSS OF FEEDWATER BYPASS/TROUBLE (K15-B1)
EXAMINER NOTE: After entering MODE 1 go to the next event.		

Op-Test No.: **2016-1** Scenario No.: **1** Event No.: **3**

Event Description: **Pressurizer Level Transmitter LT-1001 Fails High**

Time	Position	Applicant's Actions or Behavior
T=25	ATC CRS	Pressurizer Level Fails High OP-1203.015 PRESSURIZER SYSTEM FAILURE SECTION 4
	N/A	**1. IF all Pressurizer level indication is lost, THEN GO TO "Loss of All Pressurizer Level Indication" section of this procedure.**
	ATC / BOP	**2. IF one level indicator differs from the rest, THEN assume that indicator invalid AND GO TO step 5.**
		NOTE SPDS calculates temperature-compensated level for the following points: * PZR Level Red Channel (LPZR1R) * PZR Level GRN Channel (LPZR1G) Normally, these points contain values calculated by LPZR1R-T and LPZR1G-T. If either PZR temperature element (T1001 or T1002) fails, the corresponding temperature compensated level will be calculated by the RCS pressure to Tsat correlation (SPDS points LPZR1R-P and LPZR1G-P).
	ATC	**5. WHEN validity of transmitters and indicators is determined, THEN select valid Pressurizer level transmitter using HS-1002. (NNI-Y)**
	CRS	**6. IF invalid instrument indication is >16" from other level indications, THEN instrument is inoperable. Refer to Post Accident Monitoring (PAM) Instrumentation (TS 3.3.15).**
EXAMINER NOTE: CRS will enter **TS 3.3.15 Condition A** above, but not TS 3.4.1 below		
	ATC	**7. Verify Pressurizer Heater Proportional Control (PIC-1004) in AUTO.**
	CRS	**8. Refer to "RCS Pressure, Temperature and Flow DNB Surveillance Limits" of the ANO1 COLR (TS 3.4.1).**
		END OF PRESSURIZER LEVEL FAILURE
Advance to next event at lead instructor discretion.		

Op-Test No.: **2016-1** Scenario No.: **1** Event No.: **4**

Event Description: **Inadvertent ES Digital Channel 7 Actuation .**

Time	Position	Applicant's Actions or Behavior
T=35	CRS	Reference ACA 1203.012J for K11-D2
EXAMINER NOTE: CRS may go directly to the AOP for spurious actuation of the channel. P-35A has a 35 second time delay before it will start, so the operator actions may be taken before the pump is running.		
	N/A	1. IF due to ES actuation, ... N/A
	N/A	2. IF desired to clear alarm, … N/A
	N/A	3. IF due to testing, … N/A • .
	CRS	4. IF due to a spurious actuation, THEN GO TO Inadvertent ESAS Actuation (1203.053).
		Reference AOP 1203.053, Inadvertent ESAS Actuation
	CRS / ATC	**1. Check the following:** • **RCS pressure remains > 1590 psig** **RB pressure remains < 18.7 psia**
	CRS	**2. Check multiple ES digital channels have actuated.**
	CRS	2. **IF** a single channel has actuated, **THEN GO TO attachment for channel tripped.**
		Recovery From Inadvertent ES Digital Channel 7 Actuation
		CAUTION ES-actuated components overridden in other than ES position will prevent fulfillment of the associated ES function if actual trip signal is present.
	BOP	**1. Override and stop RB Spray pump (P35A).**
BOOTH: If asked to investigate, there is nothing obviously wrong with P-35A.		

Op-Test No.: **2016-1** Scenario No.: **1** Event No.: **4**

Event Description: **Inadvertent ES Digital Channel 7 Actuation .**

Time	Position	Applicant's Actions or Behavior
	BOP	**2. Override RB Spray Block valve (CV-2401).**
	BOP	**3. Place RB Spray Block CV-2401 handswitch (HS-2401) to CLOSE (modulating valve, hold control switch in CLOSE until valve torques closed).**
	CRS	**4. Review the following Tech Specs for applicability considering plant mode, component previously overridden, and known failure condition:** • **TS 3.3.7 (ESAS Actuation Logic)** • **TS 3.3.15 (PAM Instrumentation - RB Press Transmitters)** • **TS 3.6.3 (RB Isolation Valves)** • **TS 3.6.5 (RB Spray & Cooling)**
<u>EXAMINER NOTE:</u> CRS should enter **TS 3.3.7 Condition A** and possibly **TS 3.6.5 Condition A** depending on if the pump ran or not and if the crew chooses to rack down the breaker for the pump. TS 3.3.15 should not be entered since there is no indication that RB Pressure is failed. Once CV-2401 is closed, TS 3.6.3 is satisfied. The CRS may enter **TS 3.6.3 Condition A** during the time the valve was open but may not since the pump was running with intermittent flow, this would be a good follow-up discussion with the CRS.		
Proceed to the next event at the discretion of the lead examiner after the T.S. call is made.		
	N/A	**5. <u>WHEN</u> cause of actuation has been determined and corrected … N/A**
	N/A	**6. Check MAN ES lights … N/A**
	CRS Directs	**7. Write a condition report and reference TS 3.6.5 (RB Spray & Cooling) due to operation of P35A without a suction source.**
	CRS Directs	**8. Write a condition report to evaluate Reactor Building equipment based on potential of wetting of components in Reactor Building.**

Op-Test No.: **2016-1** Scenario No.: **1** Event No.: **5**

Event Description: **Loss of Non-Vital 480V Load Center B3 with a failure of C-5B Condenser Vacuum Pump to automatically start**

Time	Position	Applicant's Actions or Behavior
T=45		LOSS OF 480 V LOAD CENTER B3 with a failure of C-5B to auto start
	BOP / CRS	Reference ACA for K02-C8, NON-ES BUS LOSS OF VOLTAGE (OP-1203.012B)
	Crew	1.0 OPERATOR ACTIONS 1. Determine which non-ES bus is in alarm: bus B3
	CRS	2. Refer to Loss of Loadcenter (1203.046).
	BOP	3. Check associated feeder breaker closed (see table below): Bus / 4160V Supply / 480V Supply / Alternate 480V Supply B3 / A1 Feed to X3 A-103 / X3 Feed to B3 B312 / B3 – B4 Crosstie B432 A. IF the associated feeder breaker is open, THEN refer to Electrical System Operation (1107.001), "Reclosing Tripped Bus or MCC Feeder Breakers" section.
BOOTH: Report that there is a strong electrical odor in the area, no signs of smoke or fire.		
	N/A – Report from field will be such that the crew does NOT re-energize bus	4. IF cause of fault has been determined to NOT be on 480V bus AND normal supply is NOT available, THEN re-energize bus from alternate supply per "480V Load Center Feeder Breaker Operations" section of Electrical System Operation (1107.001).
	CRS	Reference Loss of Loadcenter AOP (Section for B3) (OP-1203.046)
EXAMINER NOTE: The standby vacuum pump (C-5B) will need to be manually started by the BOP.		
	BOP	3.3 Loss of Loadcenter B3 3.3.1 Verify Condenser Vacuum Pump (C-5B) running.
	BOP	3.3.2 Verify EH Oil Pump (P-14B) running.
	OAO	3.3.3 Verify Isophase Bus Cooling Fan (C-8B) running.
BOOTH: Report thatC-8B is running		
	ATC	3.3.4 Verify Instrument Air Compressor (C-28B) running.

Op-Test No.: **2016-1**	Scenario No.: **1**	Event No.: **5**

Event Description: **Loss of Non-Vital 480V Load Center B3 with a failure of C-5B Condenser Vacuum Pump to automatically start**

Time	Position	Applicant's Actions or Behavior
		CAUTION Failure to open "B" Main Phase Xfmr Normal Cooling Group Supply breaker from B3222B (8-5) prior to closing the cross-tie breakers will cross-tie B3 to B4, and can result in damage to both buses.
	BOP / CRS Directs OAO	3.3.5 Dispatch an operator (with a ladder) to verify Main Transformer cooling supplies from B4 as follows: • Perform the following for Main Phase Xfmr (X-01B): 1. Open breaker 8-5. 2. Close both of the following breakers (ladder required): – 8-7 – 8-8
		NOTE When completed EC12923 places Main Phase Transformers X-01C and X-01S in service.
	BOP / CRS Directs OAO	• Perform one of the following: – IF EC12923 has been implemented, THEN verify Main Phase Xfmrs (X-01C and X-01S) on B4 supply (cooling fans running). – IF EC12923 has NOT been implemented, THEN verify Main Phase Xfmrs (X-01A and X-01C) on B4 supply (cooling fans running).
BOOTH: Reports that the requested breakers for Step 3.3.5 above have been opened / closed as appropriate.		
	N/A	3.3.6 IF in the BLEED position, … N/A
	BOP	3.3.7 Verify Gland Steam Cond Exhauster (C-1B) running.
	BOP	3.3.8 Verify Air Side Seal Oil Backup Pump (P-25) running.
EXAMINER NOTE: The following NOTE has been modified to only include the component that requires operator action		

Op-Test No.: 2016-1 Scenario No.: 1 Event No.: 5

Event Description: **Loss of Non-Vital 480V Load Center B3 with a failure of C-5B Condenser Vacuum Pump to automatically start**

Time	Position	Applicant's Actions or Behavior
		NOTE Following is a list of major components supplied by loadcenter B3 either directly or via MCC: • Condenser Vacuum Pump (C-5A)
EXAMINER NOTE: Crew should identify that C-5B failed to start automatically.		
	BOP	3.3.9 Refer to list above and Attachment D of Electrical System Operations (1107.001) to determine any additional components such as ventilation systems that may require actions.
BOOTH: Acknowledge any directions given based on Step 3.3.9, and report no issues found.		
	CRS	3.3.10 Determine cause of loss of loadcenter and restore power from normal or alternate power source per the appropriate sections of Electrical System Operations (1107.001).
EXAMINER NOTE: Report from the field will be such that the crew will NOT re-energize B3.		
		END OF LOSS OF 480V LOADCENTER
Advance to next event at lead instructor discretion.		

Op-Test No.: **2016-1** Scenario No.: **1** Event No.: **6**

Event Description: **Continuous Control Rod Motion.**

Time	Position	Applicant's Actions or Behavior
T=55	CRS	Reference ACA 1203.003, Control Rod Drive Malfunction Actions, Section 9 – Continuous Control Rod Motion.
	ATC	**1. Verify the following:** • **Reactor demand H/A station in MANUAL.** • **Diamond panel in MANUAL.** A. **IF** rod motion stops, **THEN GO TO** ICS Abnormal Operation (1203.001).
	N/A	**2. IF SY lamp is energizing and de-energizing (indicating control rod or group motion), THEN set SPEED SELECTOR switch to RUN.** A. **IF** control rod motion stops, **THEN** contact I&C and System Engineering for assistance.
EXAMINER NOTE: The next step **will stop rod motion** by generating conflicting control signals for the CRD System, however the outward motion demand will remain and therefore the audible alarm will continue.		
	ATC	**3. IF control rod motion continues, THEN perform the following:** A. Verify diamond panel in MANUAL. B. Set GROUP-AUXIL switch to AUXIL. C. Set SPEED SELECTOR switch to JOG. D. Place manual command switch in the INSERT for ~3 seconds AND return manual command to neutral.
	N/A	**4. IF control rod motion continues THEN perform the following:** A. Trip reactor. B. Perform Reactor Trip (1202.001).
END OF EVENT		

Op-Test No.: ______ Scenario No.: **1** Event No.: **7**

Event Description: **Pressurizer Steam Space leak results in the need for a manual reactor trip due to RPS being failed. The Rx Trip pushbutton and the backup pushbuttons are failed so the ATC will be required to dispatch an outside operator to complete the reactor trip. ES Channels 1 and 2 are also failed and will require manual actuation in order to establish HPI which will allow the crew to regain SCM.**

Time	Position	Applicant's Actions or Behavior
T=60		PRESSURIZER STEAM SPACE LEAK
EXAMINER NOTE: The size of the leak will result in exceeding Reactor Trip criteria with a failure of RPS and a failure of the Rx Trip Pushbuttons. **Critical Task** met if communications to the outside operator to trip the local CRD breaker occurs within 1 minute of exceeding RPS setpoint of 1800 psig.		
	ATC Critical Task	Attempt to manually trip reactor prior to or within one minute of being <1800 psig
	CRS	Enter Reactor Trip EOP (OP-1202.001)
	ATC	**1. Depress Reactor Trip PB.** A. Verify all rods inserted AND **reactor power dropping.**
EXAMINER NOTE: The following are the contingency steps for tripping the reactor and must be performed within 1 minute of exceeding the RPS trip setpoint of 1800 psig.		
	ATC CT	1) **IF** reactor fails to trip, **THEN** depress CRD Power Supply Breaker Trip PBs on C03: • A-501 • B-631 a) **IF** either A-501 or B-631 fails to trip, **THEN** manually insert rods at C03. b) Dispatch an operator to open both CRD AC Power Supply breakers.
BOOTH: Insert trigger to open CRD AC breakers 1 minute after directed by the control room.		
	N/A	2) **IF** more than one rod fails to fully insert **OR** reactor power is **not** dropping, **THEN** perform Emergency Boration (RT-12).
	Crew	3) Do **not** continue until the reactor is shutdown.

Op-Test No.: _____	Scenario No.: 1	Event No.: 7

Event Description: **Pressurizer Steam Space leak results in the need for a manual reactor trip due to RPS being failed. The Rx Trip pushbutton and the backup pushbuttons are failed so the ATC will be required to dispatch an outside operator to complete the reactor trip. ES Channels 1 and 2 are also failed and will require manual actuation in order to establish HPI which will allow the crew to regain SCM.**

Time	Position	Applicant's Actions or Behavior
	N/A Turbine not on line.	**2. Depress Turbine trip PB.** A. Check Turbine throttle and governor valves closed.
	Crew	**3. Check adequate SCM.**
	CRS	Report Immediate Actions Complete
	CRS	**4. Perform the following:** • Advise Shift Manager to implement Emergency Action Level Classification (1903.010). ▪ Direct Control Board Operators to monitor floating steps
	ATC	**5. Verify Orifice Bypass (CV-1223) demand adjusted to zero.**
	BOP	**6. Open BWST T3 Outlet (CV-1407 or CV-1408) to operating HPI pump.**
	ATC	**7. <u>IF</u> Emergency Boration is <u>not</u> in progress, <u>THEN</u> adjust Pressurizer Level Control setpoint to 100".**
EXAMINER NOTE: Leak is large enough to cause ESAS Channels 1-4 to actuate and result in a LOSM. Channels 1 and 2 are failed and requires manual actuation by the ATC. This is a critical task.		
	CRS	Enter LOSM EOP (OP-1202.002)

Op-Test No.: _____ Scenario No.: 1 Event No.: 7

Event Description: **Pressurizer Steam Space leak results in the need for a manual reactor trip due to RPS being failed. The Rx Trip pushbutton and the backup pushbuttons are failed so the ATC will be required to dispatch an outside operator to complete the reactor trip. ES Channels 1 and 2 are also failed and will require manual actuation in order to establish HPI which will allow the crew to regain SCM.**

Time	Position	Applicant's Actions or Behavior
		EXAMINER NOTE: The CRS may enter the ESAS EOP (OP-1202.010) however pressure will stabilize greater than 150 psig and therefore the LOSM EOP will contain the mitigating actions for this scenario. If the ESAS EOP is entered this is not a failure, the ESAS EOP will direct transitioning to LOSM once the crew determines pressure is stable and greater than 150 psig. **CT** By manually actuating ES Channels 1 or 2 the ATC will have satisfied the step to Initiate full HPI (RT-3) even though RT-3 is not being used as guidance. Failure to actuate both would be a point deduction but not a CT failure. **CT** Manually trip all RCPs within 2 minutes of LOSM following the reactor trip and not before the reactor is tripped.
	BOP BOP ATC / BOP ATC CRS	**1. Check elapsed time since loss of adequate SCM** **AND** **perform the following:** A. **IF** ≤ 2 minutes have elapsed, **THEN** trip all RCPs: ○ P32A ○ P32B ○ P32C ○ P32D B. Initiate full HPI (RT-3). 1) **IF** Makeup Tank level drops below 18", **THEN** close Makeup Tank Outlet (CV-1275). C. Verify proper EFW actuation and control (RT-5). D. Direct Control Board Operators to monitor floating steps.
	ATC	**2. IF a feed source other than MFW is available,** **THEN trip both MFW pumps:** • **A Main Feed Pump** • **B Main Feed Pump**
	ATC	**3. Check ESAS ACTUATION alarms clear on K11.**
	ATC CT	Actuate Channels 1 and 2 of ESAS before ~~RCS pressure drops below 1550 psig~~. ... subcooling decreasing to zero.
	BOP	3. Verify proper ESAS actuation (RT-10). (Step 3 contingency action)
	ATC	**4. Check RCS press ≥ 150 psig.**

Op-Test No.: _____ Scenario No.: 1 Event No.: 7

Event Description: **Pressurizer Steam Space leak results in the need for a manual reactor trip due to RPS being failed. The Rx Trip pushbutton and the backup pushbuttons are failed so the ATC will be required to dispatch an outside operator to complete the reactor trip. ES Channels 1 and 2 are also failed and will require manual actuation in order to establish HPI which will allow the crew to regain SCM.**

Time	Position	Applicant's Actions or Behavior
	N/A	**5. IF RCS T-cold is < 540°F and dropping … N/A**
	ATC	**6. Isolate Pressurizer Spray Line as follows:** A. Place Pressurizer Spray Control Mode in MAN **AND** verify Pressurizer Spray (CV-1008) closed (modulating valve). B. Close Pressurizer Spray Isolation (CV-1009).
	ATC	**7. IF both of the following conditions exist:** • **HPI cooling is not in progress** • **ERV was not opened by procedure to intentionally depressurize the RCS** **THEN verify Electromatic Relief ERV Isolation (CV-1000) closed.**
	BOP	8. Check Nuclear Loop ICW process monitor alarm clear.
	N/A	**9. IF CET temps are superheated … N/A**
	ATC	**10. Check SG tube integrity (RT-18).**
	ATC	**11. IF SCM is adequate,** **THEN control RCS press low within limits of Figure 3 (RT-14).**

EXAMINER NOTE: Once the critical tasks are completed and pressure is being controlled, the simulator will be frozen at the direction of the lead examiner.

FREEZE AT THE DISCRETION OF THE LEAD EVALUATOR

SUPPORTING DOCUMENTATION FOR CRITICAL TASKS

ANO-1 has developed a document that utilizes technical basis documents and input from Operations Management to define acceptable performance for critical tasks. The following pages come from that document.
At the end of each critical task page, is the applicable criteria discussion pertaining to 2016-1 exam.

CT-24 Shutdown Reactor – ATWS

CT based on: Reactivity control to provide adequate shutdown margin

TBD Description
Operator must recognize and react to any of the reactor trip parameters that exceeds its limit but does not cause a reactor trip.

TBD Conditions
Failure of reactor trip either by automatic and/or manual push button commands.

Associated GEOG Bases:

ATWS could occur due to a failure of the RPS to initiate a reactor trip signal upon one of the reactor trip parameters reaching its trip limit or the control and safety rods failing to insert once the RPS trip signal is given automatically or manually. A Diverse Scram System (DSS) is provided, independent of the RPS, to minimize the potential for an ATWS event. However, the operator must recognize and react to any of the reactor trip parameters that exceeds its limit but does not cause a reactor trip.

The reactor can be generating more heat than the emergency feedwater system can remove. For this reason, attempts should be made to maintain operation of the MFW system to remove adequate heat to prevent overpressurizing the RCS. In this situation, the manual reactor trip button has been actuated but reactor power is not < the plant specific reactor power level for verification of a reactor trip. Therefore, the reactor has not been shut down and there has been a failure of all or most of the control and safety rods to insert into the reactor core. Given that RPS, DSS and the manual reactor trip have failed to trip the reactor, then immediate actions to shut down the reactor by the alternate methods should be initiated. These methods include trip of CRDM breakers and maximum rate of boron addition to the RCS. Once the

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control and safety rods are successfully tripped into the core, or sufficient boric acid has been added to provide an adequate shutdown margin, the reactor will be shut down. Adequate shutdown margin must be maintained during cooldown due to EHT and SGTR mitigation.

The priority action at this point is the shutdown of the reactor. This should be achieved prior to taking additional mitigating actions because post-trip transient mitigation, from this point forward, is based on the assumption that the reactor is shutdown (subcritical).

ANO Version(s)

(1) The reactor should be manually tripped within 1 minute of the loss of the XX bus (Loss of 2 RCPs > 55%).
(2) Reactor tripped prior to 1700# RCS pressure and within 1 minute.
(3) The reactor should be tripped within 1 minute after condenser vacuum reaches 24.5 inches or the turbine trips (with the reactor above 43% power).
(4) The reactor should be tripped within 1 minute after the turbine trips (with the reactor above 43% power).
(5) The reactor should be manually tripped within 60 seconds of the turbine trip (the Turbine should be tripped at 14 mils vibration, RPS will not auto trip the reactor, the Reactor Trip Pushbutton is failed.)
(6) The reactor should be tripped within 1 minute of the loss of the 2nd MFW pump.
(7) The reactor trip pushbutton shall be depressed within one minute of P-32B RCP breaker opening. (No RCPs running in the B RCS loop).

SES used

Justification for ANO:

(1) IAW OP-1015.050, Time Critical Operator Actions, operators are required to trip the reactor within 1 minute if RPS fails and the main reactor trip pushbutton fails. In these scenarios, the main reactor trip pushbutton is not failed although RPS is, so the TCOA criterion of 1 minute provides adequate time for the crew to recognize the condition and trip the plant as required.
(2) RPS is failed and will not cause a reactor trip at 1800# due to the lowering RCS pressure caused by the RCS leak. The criterion to have the reactor tripped prior to 1700# provides adequate time for the crew to diagnose the RPS failure and to shut down the reactor as required. The 1 minute criterion is described in (1) above.
(3) See justification in (1) above.
(4) See justification in (1) above.
(5) See justification in (1) above.
(6) See justification in (1) above.
(7) See justification in (1) above.

For the 2016-1 ILO NRC Exam criteria, the applicant will perform all contingency actions to include dispatching the Auxiliary Operator to open the AC CRD Power Supply Breakers. The communication to the AO must be performed not to exceed 1 minute after exceeding the RPS Trip Setpoint of 1800 psig.

CT-2 **Initiate HPI**

CT based on: Add/Maintain appropriate RCS water mass

TBD Description
Initiate full HPI anytime SCM is lost to provide maximum core heat removal.
Provide subcooled water for 1^0 to 2^0 heat transfer.
TBD also addresses balancing HPI flow.

TBD Conditions
SCM lost

Associated GEOG Bases:

Whenever SCM is lost, full HPI flow must be provided to the RCS. Full HPI flow is established to provide maximum core heat removal. HPI will provide heat removal from the core by continual addition of low enthalpy water to the RCS. Full HPI flow is required to restore SCM as quickly as possible. As long as SCM exists the core is assured of being covered and, therefore, adequately cooled. For this reason, it is important to reestablish SCM as quickly as possible. Also, full HPI flow is required to provide subcooled RC for primary to secondary heat transfer. If the SGs are available for heat removal, then adding water to the RCS will replenish the heat transfer medium for primary to secondary heat transfer.

Full HPI is achieved by operating two HPI pumps and balancing the HPI flow. HPI flow should be verified as full flow for current RCS pressure conditions. The intent of balancing the HPI flow is to address such failures as a break in the HPI injection line. These failures will cause imbalances in the HPI flow with the result that that HPI to the RV may not be as large as possible. For example, if an HPI line break exists, the broken line may have a much higher flow rate than in each of the unbroken lines. If flow is throttled only in the broken line, then more flow will go through each of the other lines to the RCS and less HPI water will be lost out the broken line, thus, the flowrate in each line will trend toward a balanced condition. The intent of balancing the flow is to increase the total flow reaching the RCS and not to try to make the flow through each flow path exactly equal. Balancing may or may not be inherent in the HPI system design by use of such devices as cross-connected injection lines, venturi flow nozzles, orifices and preset valve positions.

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ANO Version(s)
(1) Actions to initiate HPI should be started before SCM becomes inadequate at <30°F.
(2) HPI should be initiated before subcooling margin reaches <25°F or RCS pressure becomes <1550 psig.
(3) ESAS Ch. 1 should be actuated before RT-10 reported complete IAW Transient Conduct of Operations.

SES used

Justification for ANO:

(1) Action to initiate HPI is necessary to provide makeup for the RCS inventory that is being lost to the secondary system (SGTR). Initiating HPI prior to the LSCM prevents unnecessary challenges to the controlled shutdown, cooldown, and isolation of the affected SG.

(2) Initiation of HPI with a PZR steam space leak is necessary to maintain RCS pressure and inventory that will be lost via the leak. Since ES Channels 1 and 2 are failed (auto actuation will not occur), 1550# RCS Pressure provides adequate time for the ATC to recognize the failure and to manually actuate the failed channels. 25F SCM also provides adequate time for the crew to recognize the need for HPI and to initiate it appropriately.

(3) Initiation of the failed Channel 1 of ESAS is accomplished to provide redundancy for HPI injection and maintain a greater margin to core uncovery. The TBD shows that one HPI pump is all that is required for adequate core cooling, however, this results in a smaller margin to core uncovery.

Either

For the 2016-1 ILO NRC Exam criteria (2) is applicable. ~~Both~~ Channels 1 or 2 should be actuated ~~prior to RCS press <1550 psig.~~ ... prior to subcooling decreasing to zero.

CT-1 **Trip all RCPs** (Rule 1.0)

CT based on: Add/Maintain appropriate RCS water mass

TBD Description
Trip all RCPs immediately, no later than 1 or 2 min

TBD Conditions
Anytime adequate SCM is lost

Associated GEOG BASES:

SBLOCA analyses were performed using conservative Appendix K assumptions with the objective of meeting 10CFR50.46 criteria. These analyses predicted that continued RCP operation, during certain SBLOCAs, could lead to RCS void fractions of 70% if RCPs continued to operate longer than [1 or 2] minutes following initiation of the SBLOCA. The analyses predicted that if RCPs were tripped after these high void fractions occurred, the core would not be adequately covered and fuel clad failure would occur.

For more realistic assumptions (e.g., full flow from 2 HPI pumps, 1.0 times decay heat, etc.) the time period to reach these high RCS void fractions was > 10 minutes. However, the GEOG maintained the [1 or 2] minute time period for the following reasons:

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- The process of achieving and verifying full HPI flow may take more than [1 or 2] minutes. Also, such a verification requirement represents additional "time constrained diagnosis" operator burden (Reference 3.0).
- The use of a 1 or 2 minute and a 10 minute contingency, in the guidance, was considered to increase complexity and the likelihood of confusion.
- The RCP trip on loss of SCM is intended to be an immediate action and to eliminate/reduce time-based decisions (Reference 3.0). Divergence from the concept of immediate to that of measuring time and then acting is expected to detract from this intent.

ANO Version(s)
The RCPs should be tripped within two minutes of a Loss of Adequate Subcooling Margin.
TCOA per OP-1015.050

Justification for ANO
As described in the TBD.
As noted above, this is a Time Critical Operator Action per OP-1015.050.

For the 2016-1 ILO NRC Exam criteria RCPs should be tripped within 2 minutes of LOSM following the reactor trip. Since the reactor cannot be tripped from within the control room, the RCPs should not be tripped before the reactor is tripped.

ANTICIPATORY REACTOR TRIP SYSTEM (ARTS) RESET

1.0 WHEN first Main Feedwater Pump is placed into service,
THEN perform the following to reset RPS ARTS trip:

_______/____
Date/Time

CAUTION
Depressing TRIP switch will trip the channel even if feed pump trip function is bypassed.

1.1 In RPS Channel A Cabinet (C41) perform the following:

1.1.1 Obtain SRO/RO Concurrent Verification of steps in this subsection. ⟵

1.1.2 Depress "test" switch labeled "RESET" on contact buffer lower module for the started Main Feedwater Pump.

1.1.3 Verify two red lights on contact buffer change state (top comes ON, bottom goes OFF).

1.1.4 Verify white light "MFWP" "A" ("B") "TRIPPED" (for the started MFWP) goes DIM.

1.2 In RPS Channel B Cabinet (C42) perform the following:

1.2.1 Obtain SRO/RO Concurrent Verification of steps in this subsection. ⟵

1.2.2 Depress "test" switch labeled "RESET" on contact buffer lower module for the started Main Feedwater Pump.

1.2.3 Verify two red lights on contact buffer change state (top comes ON, bottom goes OFF).

1.2.4 Verify white light "MFWP" "A" ("B") "TRIPPED" (for the started MFWP) goes DIM.

1.3 In RPS Channel C Cabinet (C43) perform the following:

1.3.1 Obtain SRO/RO Concurrent Verification of steps in this subsection. ⟵

1.3.2 Depress "test" switch labeled "RESET" on contact buffer lower module for the started Main Feedwater Pump.

1.3.3 Verify two red lights on contact buffer change state (top comes ON, bottom goes OFF).

1.3.4 Verify white light "MFWP" "A" ("B") "TRIPPED" (for the started MFWP) goes DIM.

1.4 In RPS Channel D Cabinet (C44) perform the following:

1.4.1 Obtain SRO/RO Concurrent Verification of steps in this subsection.

1.4.2 Depress "test" switch labeled "RESET" on contact buffer lower module for the started Main Feedwater Pump.

1.4.3 Verify two red lights on contact buffer change state (top comes ON, bottom goes OFF).

1.4.4 Verify white light "MFWP" "A" ("B") "TRIPPED" (for the started MFWP) goes DIM.

NOTE
Independent Verification is performed by a different operator than the one that reset the ARTS trip.

2.0 Perform independent verification of ARTS reset for first Main Feedwater Pump placed into service as follows:

2.1 In RPS Channel A Cabinet (C41), verify:

2.1.1 Contact buffer for the started Main Feedwater pump has top red light ON.

2.1.2 White light "MFWP A" ("B") "TRIPPED" (for the started Main Feedwater pump) is DIM.

2.2 In RPS Channel B Cabinet (C42), verify:

2.2.1 Contact buffer for the started Main Feedwater pump has top red light ON.

2.2.2 White light "MFWP A" ("B") "TRIPPED" (for the started Main Feedwater pump) is DIM.

2.3 In RPS Channel C Cabinet (C43), verify:

2.3.1 Contact buffer for the started Main Feedwater pump has top red light ON.

2.3.2 White light "MFWP A" ("B") "TRIPPED" (for the started Main Feedwater pump) is DIM.

2.4 In RPS Channel D Cabinet (C44), verify:

2.4.1 Contact buffer for the started Main Feedwater pump has <u>top</u> red light ON.

2.4.2 White light "MFWP A" ("B") "TRIPPED" (for the started Main Feedwater pump) is DIM.

3.0 <u>WHEN</u> Main Turbine startup is complete,
<u>AND</u> generator is ready to be loaded,
<u>THEN</u> perform the following to reset RPS ARTS trip: _____/_____
Date/Time

CAUTION
Depressing TRIP switch will trip the channel even if turbine trip is bypassed.

3.1 Perform the following to reset RPS trips in RPS Chnl A Cabinet (C41):

3.1.1 Depress "test" switch labeled "RESET" on contact buffer lower module for main turbine.

3.1.2 Verify two red lights on contact buffer change state (top comes ON, bottom goes OFF).

3.1.3 Verify white light "turbine tripped" goes DIM.

3.2 Perform the following to reset RPS trip in RPS Chnl B Cabinet (C42):

3.2.1 Depress "test" switch labeled "RESET" on contact buffer lower module for main turbine.

3.2.2 Verify two red lights on contact buffer change state (top comes ON, bottom goes OFF).

3.2.3 Verify white light "turbine tripped" goes DIM.

3.3 Perform the following to reset RPS trip in RPS Chnl C Cabinet (C43):

3.3.1 Depress "test" switch labeled "RESET" on contact buffer lower module for main turbine.

3.3.2 Verify two red lights on contact buffer change state (top comes ON, bottom goes OFF).

3.3.3 Verify white light "turbine tripped" goes DIM.

3.4 Perform the following to reset RPS trip in RPS Chnl D Cabinet (C44):

3.4.1 Depress "test" switch labeled "RESET" on contact buffer lower module for main turbine.

3.4.2 Verify two red lights on contact buffer change state (top comes ON, bottom goes OFF).

3.4.3 Verify white light "turbine tripped" goes DIM.

NOTE

Independent verification is performed by a different operator than the one that reset the ARTS trip.

4.0 Perform independent verification of ARTS reset for Main Turbine as follows:

4.1 In RPS Channel A Cabinet (C41) verify:

4.1.1 Contact buffer for main turbine has <u>top</u> red light on.

4.1.2 White light "turbine tripped" is DIM.

4.2 In RPS Channel B Cabinet (C42) verify:

4.2.1 Contact buffer for main turbine has <u>top</u> red light on.

4.2.2 White light "turbine tripped" is DIM.

4.3 In RPS Channel C Cabinet (C43) verify:

4.3.1 Contact buffer for main turbine has <u>top</u> red light on.

4.3.2 White light "turbine tripped" is DIM.

4.4 In RPS Channel D Cabinet (C44) verify:

4.4.1 Contact buffer for main turbine has <u>top</u> red light on.

4.4.2 White light "turbine tripped" is DIM.

5.0 IF second Main Feedwater Pump is in-service,
THEN perform the following to reset RPS ARTS trip: ______/______
Date/Time

CAUTION
Depressing TRIP switch will trip the channel even if feed pump trip function is bypassed.

5.1 In RPS Channel A Cabinet (C41) perform the following:

5.1.1 Obtain SRO/RO Concurrent Verification of steps in this subsection.

5.1.2 Depress "test" switch labeled "RESET" on contact buffer lower module for the started Main Feedwater Pump.

5.1.3 Verify two red lights on contact buffer change state (top comes ON, bottom goes OFF).

5.1.4 Verify white light "MFP" "A" ("B") "TRIPPED" (for the started MFP) goes DIM.

5.2 In RPS Channel B Cabinet (C42) perform the following:

5.2.1 Obtain SRO/RO Concurrent Verification of steps in this subsection.

5.2.2 Depress "test" switch labeled "RESET" on contact buffer lower module for the started Main Feedwater Pump.

5.2.3 Verify two red lights on contact buffer change state (top comes ON, bottom goes OFF).

5.2.4 Verify white light "MFP" "A" ("B") "TRIPPED" (for the started MFP) goes DIM.

5.3 In RPS Channel C Cabinet (C43) perform the following:

5.3.1 Obtain SRO/RO Concurrent Verification of steps in this subsection.

5.3.2 Depress "test" switch labeled "RESET" on contact buffer lower module for the started Main Feedwater Pump.

5.3.3 Verify two red lights on contact buffer change state (top comes ON, bottom goes OFF).

5.3.4 Verify white light "MFP" "A" ("B") "TRIPPED" (for the started MFP) goes DIM.

5.4 In RPS Channel D Cabinet (C44) perform the following:

5.4.1 Obtain SRO/RO Concurrent Verification of steps in this subsection.

5.4.2 Depress "test" switch labeled "RESET" on contact buffer lower module for the started Main Feedwater Pump

5.4.3 Verify two red lights on contact buffer change state (top comes ON, bottom goes OFF).

5.4.4 Verify white light "MFP" "A" ("B") "TRIPPED" (for the started MFP) goes DIM.

NOTE

Independent verification is performed by a different operator than the one that reset the ARTS trip.

6.0 Perform independent verification of ARTS reset for second Main Feedwater Pump placed into service as follows:

6.1 In RPS Channel A Cabinet (C41) verify:

6.1.1 Contact buffer for the started Main Feedwater pump has <u>top</u> red light ON.

6.1.2 White light "MFP" "A" ("B") "TRIPPED" (for the started Main Feedwater pump) is DIM.

6.2 In RPS Channel B Cabinet (C42) verify:

6.2.1 Contact buffer for the started Main Feedwater pump has <u>top</u> red light ON.

6.2.2 White light "MFP" "A" ("B") "TRIPPED" (for the started Main Feedwater pump) is DIM.

6.3 In RPS Channel C Cabinet (C43) verify:

6.3.1 Contact buffer for the started Main Feedwater pump has top red light ON.

6.3.2 White light "MFP A" ("B") "TRIPPED" (for the started Main Feedwater pump) is DIM.

6.4 In RPS Channel D Cabinet (C44) verify:

6.4.1 Contact buffer for the started Main Feedwater pump has top red light ON.

6.4.2 White light "MFP" "A" ("B") "TRIPPED" (for the started Main Feedwater Pump) is DIM.

EMERGENCY BORATION

NOTE
If an unexpected delay occurs in implementation of Step 1, then promptly initiate Emergency Boration using HPI per step 2.

1. <u>IF</u> Boric Acid pump (P39A or P39B) and Batch Controller are available, <u>THEN</u> perform the following:

A. <u>IF</u> both OP and STBY HPI Pumps are off
<u>OR</u>
Letdown is isolated,
<u>THEN</u> GO TO step 2.

B. Set Batch Controller for maximum batch size as follows:

1) Depress lower DISPLAY.

2) Depress TOTAL.

3) Depress TOTAL RESET.

4) Depress BATCH SET.

5) Depress 9, six times.

6) Depress ENTER.

7) Depress lower DISPLAY.

C. Verify Condensate to Batch Controller (CV-1251) closed.

D. Open Batch Controller Outlet (CV-1250).

E. Verify both Makeup Filters in service:

- F3A
- F3B

F. Record initial BAAT (T-6) level ____________ in.

G. Start available Boric Acid pump(s) (P39A or P39B or both).

(1. CONTINUED ON NEXT PAGE)

EMERGENCY BORATION

1. (Continued)

H. Start Batch Controller by depressing RUN key.

I. Adjust Batch Controller Flow CNTRL VLV (CV-1249) to 100% open as follows:

1) Depress VALVE SET.

2) Depress numbers: 1, 0, 0.

3) Depress ENTER.

4) Depress lower DISPLAY.

5) Depress RATE.

J. **<u>IF</u>** Batch Controller output rate < 5 gpm,
<u>THEN</u> perform the following:

1) Stop running Boric Acid pump(s):

- P39A
- P39B

2) Close Batch Controller Outlet (CV-1250).

3) Stop Batch Controller by depressing STOP key.

4) **GO TO step 2.**

K. Adjust Pressurizer Level Control Setpoint to 220".

L. Verify BWST T3 Outlet to OP HPI pump (CV-1407 or CV-1408) open.

M. **<u>WHEN</u>** PZR level is ≥ 100",
<u>THEN</u> establish maximum Letdown flow allowed by cooling capacity and component limitations.

(1. CONTINUED ON NEXT PAGE)

EMERGENCY BORATION

1. (Continued)

N. Perform the following as necessary to maintain Makeup Tank level 55 to 86":

1) Close Batch Controller Outlet (CV-1250).

2) Stop running Boric Acid pump(s):

- P39A
- P39B

3) Place 3-Way Valve (CV-1248) in BLEED.

4) **WHEN** Makeup Tank level is lowered to desired level,
THEN perform the following:

a) Return 3-Way Valve (CV-1248) to LETDOWN.

b) Start available Boric Acid pump(s) (P39A or P39B or both).

c) Open Batch Controller Outlet (CV-1250).

O. As time permits, determine actual required boration as follows:

1) Obtain required boron concentration from Plant Data Book. ________ PPM

2) Calculate batch add required using Plant Computer
OR
Soluble Poison Concentration Control (1103.004), Attachment A.3, "Feed Volume For Batch Boration or Dilution". ________ gal

3) Use 1103.004, Attachment D, "Volume of BAAT Vs. Depth of Liquid" to determine desired final BAAT level. ________ ”

(1. CONTINUED ON NEXT PAGE)

EMERGENCY BORATION

1. (Continued)

P. **<u>WHEN</u>** required amount of boric acid has been added per **step 1.O.**
<u>OR</u>
as determined by Reactor Engineering,
<u>THEN</u> perform the following:

1) Stop Boric Acid pump(s):

- P39A
- P39B

2) Close Batch Controller Outlet (CV-1250).

3) Verify Makeup Tank level 55 to 86".

4) Close BWST T3 Outlet to OP HPI pump (CV-1407 or CV-1408).

5) Adjust Letdown flow to desired rate.

EMERGENCY BORATION

**2. <u>IF</u> HPI will be used for emergency boration,
<u>THEN</u> perform the following:**

A. Initiate HPI per RT-2.

B. Verify HPI Block valve (CV-1220 or CV-1285) associated with running HPI pump open.

C. **<u>IF</u>** Letdown is in service,
<u>THEN</u> place 3-Way Valve (CV-1248) in BLEED.

D. **<u>WHEN</u>** PZR level is ≥ 100",
<u>THEN</u> establish maximum Letdown flow allowed by cooling capacity and component limitations.

E. Maintain PZR level 200 to 220" as follows:

1) Verify both HPI Pump RECIRC Blocks open:

- CV-1300
- CV-1301

2) Throttle HPI Block valve (CV-1220 or CV-1285) as necessary.

F. As time permits, determine actual required boration as follows:

1) Obtain required boron concentration from Plant Data Book. ________ PPM

2) Calculate final BWST level for required boron addition using Plant Computer
<u>OR</u>
Soluble Poison Concentration Control (1103.004), Attachment A.6, "Continuous Feed and Bleed from BWST". ________ ft

G. **<u>WHEN</u>** required amount of boric acid has been added per **step 2.F.**
<u>OR</u>
as determined by Reactor Engineering,
<u>THEN</u> perform the following:

1) Operate HPI as directed by CRS.

2) Adjust Letdown flow as directed by CRS.

END

RT-5

VERIFY PROPER EFW ACTUATION AND CONTROL

1. Verify EFW actuation indicated on C09:

Train A:	**Train B:**
• Bus 1	• Bus 1
• Bus 2	• Bus 2

> **NOTE**
> Table 1 contains EFW fill rate and level bands for various plant conditions.

**2. Verify at least one EFW pump (P7A or P7B) running with flow to SG(s) through applicable
EFW CNTRL valve(s).**

SG A		**SG B**
CV-2645	**P7A**	CV-2647
CV-2646	**P7B**	CV-2648

**3. IF SCM is not adequate,
THEN perform the following:**

A. Select Reflux Boiling setpoint for the following:

- Train A
- Train B

> **NOTE**
> Table 2 contains examples of less than adequate/excessive EFW flow.

B. Verify EFW CNTRL valves operate to establish and maintain SG levels 370 to 410”.

(3. CONTINUED ON NEXT PAGE)

VERIFY PROPER EFW ACTUATION AND CONTROL

3. (Continued)

1) **<u>IF</u>** both SGs are available,
<u>THEN</u> verify SG level rising and tracking EFIC setpoint until 370 to 410” is established.

   a) **<u>IF</u>** EFW flow is less than adequate,
   <u>THEN</u> control EFW to applicable SG in HAND to maintain ≥ 340 gpm to applicable SG until level is 370 to 410”.

   b) **<u>IF</u>** EFW flow is excessive
   <u>AND</u>
   > 340 gpm to either SG,
   <u>THEN</u> throttle EFW to applicable SG in HAND to limit SG depressurization.
   Do **<u>not</u>** throttle below 340 gpm on either SG until SG level is 370 to 410”.

2) **<u>IF</u>** only one SG is available,
<u>THEN</u> feed available SG in HAND at ≥ 570 gpm until SG level is 370 to 410”.

3) **<u>IF</u>** EFW is being controlled in HAND
<u>AND</u>
SG press drops below 720 psig due to EFW flow induced overcooling,
<u>THEN</u> continue feeding at required minimum rate
<u>AND</u> perform the following:

   a) Bypass MSLI by momentarily placing SG Bypass toggle switch on each EFIC cabinet Initiate module in BYPASS.

   - C37-3
   - C37-4
   - C37-1
   - C37-2

   b) Place applicable EFW CNTRL valves in VECTOR OVERRIDE:

<u>SG A</u>		**<u>SG B</u>**
CV-2645	**P7A**	CV-2647
CV-2646	**P7B**	CV-2648

   c) Place applicable EFW ISOL valves in MANUAL.

<u>SG A</u>		**<u>SG B</u>**
CV-2627	**P7A**	CV-2620

VERIFY PROPER EFW ACTUATION AND CONTROL

4. **<u>IF</u> SCM is adequate,**
   <u>THEN</u> perform the following:

> **<u>CAUTION</u>**
>
> Excessive EFW flow can result in loss of SCM due to RCS shrinkage.

> **<u>NOTE</u>**
>
> - Table 2 contains examples of less than adequate/excessive EFW flow.
> - Expect CETs to rise until natural circ conditions are established. If EFW flow control is in HAND, additional flow may not be necessary to prevent rising CETs until natural circ conditions are established.

A. Verify EFW CNTRL valves operate to establish and maintain applicable SG level band per Table 1.

1) **<u>IF</u>** EFW flow is less than adequate
   <u>OR</u>
   EFW flow is excessive,
   <u>THEN</u> control EFW to applicable SG in HAND as necessary to ensure the following:

   - Maintain sufficient EFW flow to prevent rise in CET temp.
   - Maintain continuous EFW flow until applicable level band is reached.
   - Maintain sufficient EFW flow to ensure SG level is either stable **<u>OR</u>** rising until applicable level band is reached.

5. **<u>IF</u> all RCPs are off,**
   <u>THEN</u> check primary to secondary heat transfer in progress indicated by all of the following:

   - T-cold tracking associated SG T-sat (Fig. 2)
   - T-hot tracking CET temps
   - T-hot/T-cold ΔT stable or dropping

6. **Monitor EMERGENCY FEEDWATER and EFIC alarms on K12.**

VERIFY PROPER EFW ACTUATION AND CONTROL

Table 1

EFIC Automatic Level Control Setpoints

Condition	Level Band	Automatic Fill Rate
Any RCP running	20 to 40”	No fill rate limit
All RCPs off and Natural Circ selected	300 to 340”	2 to 8”/min
All RCPs off and Reflux Boiling selected	370 to 410”	2 to 8”/min

Table 2

Examples of Less Than Adequate EFW Flow Indications

- SG level < 20” and no EFW flow indicated
- All RCPs off and SG level not tracking EFIC calculated setpoint
- All RCPs off and EFIC level setpoint not trending toward applicable level band

Examples of Excessive EFW Flow Indications

- SG press drops ≥ 100 psig due to EFW flow induced overcooling
- SCM approaching minimum adequate due to EFW flow induced overcooling
- EFW CNTRL valve open with associated SG level > applicable setpoint level band

END

VERIFY PROPER ESAS ACTUATION

NOTE
Obtain Shift Manager/CRS permission prior to overriding ES.

1. **Verify BWST T3 Outlets open:**

   - CV-1407
   - CV-1408

   A. **IF** BWST T3 Outlet (CV-1407 or CV-1408) fails to open,
   THEN override **AND** stop associated HPI, LPI, and RB Spray pumps until failed valve is opened:

CV-1407	CV-1408
P34A	P34B
P36A/B	P36C/B
P35A	P35B

2. **Verify SERV WTR to DG1 and DG2 CLRs open:**

   - CV-3806
   - CV-3807

VERIFY PROPER ESAS ACTUATION

3. **IF any RCP is running,**
   THEN perform the following:

   A. **IF** ES Channel 5 or 6 has actuated,
   THEN perform the following:

   1) **IF** SCM is adequate,
   THEN trip all running RCPs due to loss of ICW:

   - P32A
   - P32B
   - P32C
   - P32D

   2) **IF** SCM is **not** adequate,
   THEN check elapsed time since loss of adequate SCM
   AND perform the following:

   a) **IF** $\leq$ 2 minutes have elapsed,
   THEN trip all RCPs:

   - P32A
   - P32B
   - P32C
   - P32D

   b) **IF** > 2 minutes have elapsed,
   THEN perform the following:

   (1) Leave currently running RCPs on.

   (2) **IF** RCS press > 150 psig,
   THEN notify CRS to **GO TO 1202.002, "LOSS OF SUBCOOLING MARGIN"** procedure.

   (3) Restore RCP services per RT-8 while continuing.

   B. **IF** neither ES channel 5 nor 6 has actuated,
   THEN dispatch an operator to perform Service Water And Auxiliary Cooling System (1104.029) Exhibit B, "Restoring SW to ICW Following ES Actuation" while continuing.

   1) **WHEN** ICW Cooler SW Outlets and Bypasses are aligned per 1104.029, Exhibit B,
   THEN override **AND** open one Service Water to ICW Coolers Supply (CV-3811 or CV-3820).

VERIFY PROPER ESAS ACTUATION

4. **Verify proper ESAS Channels tripped:**

Condition	**Channels Actuated**
RCS press ≤ 1550 psig	1,2,3,4
RB press ≥ 18.7 psia	1,2,3,4,5,6
RB press ≥ 44.7 psia	7,8,9,10

5. **Perform the following:**

   A. Verify each component properly actuated on C16 and C18, **except** those overridden in previous steps.

   B. Verify proper ES system flow rates.

NOTE

- During ESAS actuation, low LPI flow is expected until RCS depressurizes below LPI pump shutoff head.
- During large break LOCAs, high LPI flow can be experienced. Flow must be throttled to ensure ECCS flows are maintained within assumptions of calculations.

      1. **IF** any of the following conditions exist:

         - A HPI FLOW HI/LO (K11-A4)
         - B HPI FLOW HI/LO (K11-A5)
         - A LPI FLOW HI/LO (K11-B4)

         - B LPI FLOW HI/LO (K11-B5)
         - A RB SPRAY FLOW HI (K11-C4)
         - B RB SPRAY FLOW HI (K11-C5)

         THEN use Annunciator K11 Corrective Action (1203.012J) to clear unexpected alarms.

   C. **IF** only one train of HPI is available
      AND
      RCS press is > 600 psig,
      THEN throttle HPI Block valve with the highest flow to within 20 gpm of the next highest flow.

VERIFY PROPER ESAS ACTUATION

6. On C10, perform the following:

- Verify DGs operating within normal limits:
  - DG 1
    - 4100 to 4200 V
    - 59.5 to 60.5 Hz
    - ≤ 2750 KW
  - DG 2
    - 4100 to 4200 V
    - 59.5 to 60.5 Hz
    - ≤ 2750 KW
- Verify the following breakers open:
  - A3-A4 Crossties:
    - A-310
    - A-410
  - B5-B6 Crossties:
    - B-513
    - B-613
  - Unit AUX feeds to A1 and A2:
    - A-112
    - A-212
- Verify the following breakers closed:
  - A3 Feeds to B5:
    - A-301
    - B-512
  - A4 Feeds to B6:
    - A-401
    - B-612

7. On C09, perform the following:

A. Check AUX Cooling Water header depressurized.

B. **IF** proper EFW actuation and control has **not** already been verified, **THEN** verify proper EFW actuation and control (RT-5).

VERIFY PROPER ESAS ACTUATION

8. On C19, perform the following:

A. Verify LPI (Decay Heat) Room Cooler running in each Decay Heat Room:

P34A Room	P34B Room
VUC1A or B	VUC1C or D

B. **IF** RB Spray has actuated,
THEN verify SW to RB Spray P35A and P35B LO CLRs open:

- CV-3804
- CV-3805

9. IF all RCPs are off
AND
RCP Seal INJ Block (CV-1206) is closed,
THEN place RCP Seal Bleedoff (Alternate Path to Quench Tank) controls in CLOSE:

- SV-1271
- SV-1273
- SV-1270
- SV-1272

10. IF leakage into the RB is indicated,
THEN verify RB cooling maximized:

A. Verify all four RB Cooling Fans running:

- VSF1A
- VSF1C
- VSF1B
- VSF1D

B. Verify RB Cooling Coils Service Water Inlet/Outlet valves open:

- CV-3812/CV-3814
- CV-3813/CV-3815

C. Verify key-locked Chiller Bypass Dampers unlatched:

- SV-7410
- SV-7412
- SV-7411
- SV-7413

VERIFY PROPER ESAS ACTUATION

11. **Initiate RB H_2 sampling using Containment Hydrogen Control (1104.031), Exhibit A.**

12. **Verify each component properly actuated on C26.**

13. **Verify the following sample valves closed on C26:**

- Pressurizer Steam Space Sample Valve (CV-1814)
- Pressurizer Water Space Sample Valve (CV-1816)
- Hot Leg Sample (SV-1840)

14. **Verify the following High Point Vents closed:**

A Loop	B Loop	Reactor Vessel	Pressurizer
• SV-1081	• SV-1091	• SV-1071	
• SV-1082	• SV-1092	• SV-1072	• SV-1077
• SV-1083	• SV-1093	• SV-1073	• SV-1079
• SV-1084	• SV-1094	• SV-1074	

15. **<u>IF</u> AUX Lube Oil pump for running HPI pump fails to stop after 20 second time delay, <u>THEN</u> within one hour of ESAS actuation dispatch an operator to stop AUX Lube Oil pump locally at breaker while continuing:**

P64A	P64B	P64C
B5721	B5722/B6515	B6514

16. **Place running Low Pressure Injection (Decay Heat) Pump (P34A/P34B) hand switches in NORMAL-AFTER-START to enable DECAY HEAT PUMP TRIP (K09-A7) alarm:**

- P34A
- P34B

17. **Monitor ENGINEERED SAFEGUARDS ACTUATION SYSTEM alarms on K11.**

VERIFY PROPER ESAS ACTUATION

18. **IF any of the following components/systems are in service:**

    - **Condensate Pumps**
    - **Condenser Vacuum Pumps**
    - **Waterbox Vacuum Pumps**
    - **Seal Oil System**
    - **Control Room Chillers**

    THEN coordinate with CRS/SM to secure components and/or systems, as time permits.

19. **Coordinate with CRS/SM to re-verify component actuation with another operator.**

END

CONTROL RCS PRESS

NOTE
• PTS limits apply if any of the following has occurred: – HPI on with all RCPs off – RCS C/D rate > 100°F/hr with Tcold < 355°F – RCS C/D rate > 50°F/hr with Tcold < 300°F • Once invoked, PTS limits apply until an evaluation is performed to allow normal press control. • When PTS limits are invoked OR SGTR is in progress, PZR cooldown rate limits do not apply. • PZR cooldown rate <100°F/hr.

1. **IF PTS limits apply or RCS leak exists,**
   THEN maintain RCS press low within limits of Figure 3.

2. **IF RCS press is controlled AND will be reduced below 1650 psig,**
   THEN bypass ESAS as RCS press drops below 1700 psig.

3. **IF PZR steam space leak exists,**
   THEN limit RCS press as PZR goes solid by one or more of the following:

   A. Throttle makeup flow.

   B. **IF** SCM is adequate,
      THEN throttle HPI flow by performing the following:

      1) Verify both HPI Recirc Blocks open:

         - CV-1300
         - CV-1301

      2) Throttle HPI.

   C. Raise Letdown flow.

      1) **IF** ESAS has actuated,
         THEN unless fuel damage or RCS to ICW leak is suspected, restore Letdown per RT-13.

   D. Verify Electromatic Relief ERV Isolation open (CV-1000)
      AND cycle Electromatic Relief ERV (PSV-1000).

CONTROL RCS PRESS

4. <u>IF</u> RCS press is high,
<u>THEN</u> limit press using one or more of the following:

A. Throttle makeup flow.

B. Throttle HPI flow by performing the following:

1) Check adequate SCM **<u>AND</u>** any of the following conditions met:

- HPI Cooling (RT-4) **<u>not</u>** in progress
- CET temps dropping
- RCS press rising with Electromatic Relief ERV (PSV-1000) open

2) Verify both HPI Recirc Blocks open:

- CV-1300
- CV-1301

3) Throttle HPI.

C. **<u>IF</u>** RCP is running,
<u>THEN</u> operate Pressurizer Spray Control (CV-1008) in HAND.

D. **<u>IF</u>** PZR AUX Spray is in service,
<u>THEN</u> throttle Pressurizer AUX Spray (CV-1416) open.

E. Place Pressurizer Heaters in OFF.

F. Raise Letdown flow.

1) **<u>IF</u>** ESAS has actuated,
<u>THEN</u> unless fuel damage or RCS to ICW leak is suspected restore Letdown per RT-13.

G. Verify Electromatic Relief ERV Isolation open (CV-1000)
<u>AND</u> cycle Electromatic Relief ERV (PSV-1000).

(4. CONTINUED ON NEXT PAGE)

CONTROL RCS PRESS

4. (Continued)

H. **<u>IF</u>** desired to secure HPI pump(s),
<u>THEN</u> perform the following:

1) Start AUX Lube Oil pumps for associated HPI pump(s):

<u>P36A</u>	**<u>P36B</u>**	**<u>P36C</u>**
P64A	P64B	P64C

2) Stop desired HPI pump(s):

- P36A
- P36B
- P36C

3) Close all associated HPI Block valves:

<u>P36A/B</u>	**<u>P36B/C</u>**
• CV-1219	• CV-1227
• CV-1220	• CV-1228
• CV-1278	• CV-1284
• CV-1279	• CV-1285

5. <u>IF</u> RCS press is low,
<u>THEN</u> raise press using one or more of the following:

A. Raise makeup flow.

B. Raise HPI flow or initiate HPI per RT-2.

C. **<u>IF</u>** RCP is running,
<u>THEN</u> verify Pressurizer Spray Control (CV-1008) closed.

D. Reduce Letdown flow.

E. Place Pressurizer Heaters in MANUAL.

(5. CONTINUED ON NEXT PAGE)

CONTROL RCS PRESS

5. (CONTINUED)

CAUTION
If HPI cooling is in progress, Electromatic Relief ERV Isolation (CV-1000) must be left open until HPI cooling is no longer required.

F. Verify Electromatic Relief ERV (PSV-1000) or Electromatic Relief ERV Isolation (CV-1000) closed.

CAUTION
With RCS solid, 1°F temp change can cause 100 psig press change.

6. IF PZR is solid,
THEN RCS press may also be controlled by varying RCS temperature.

- Raise RCS temp to raise RCS press
- Lower RCS temp to lower RCS press

NOTE
Adjusting Pressurizer Level Control setpoint and HPI as necessary to maintain normal makeup flow on-scale will allow CV-1235 to automatically compensate for small changes in RCS leak rate and cooldown rate.

7. IF normal makeup is in service
AND
HPI is in service,
THEN adjust Pressurizer Level Control setpoint and HPI as necessary to maintain normal makeup flow on-scale.

END

Facility: **ANO-1** Scenario No.: **3** Op-Test No.: **2016**

Examiners: ______ Operators: ______

Initial Conditions: **35% power**

Turnover: **35% power, P-34A Surveillance in progress and ready for pump start**
Pleasant Hill Line OOS, Breakers B5122 and B5148 Open to isolate the line.

Event No.	Position	Event Type*	Event Description
1	BOP CRS	N TS	Perform P-34A Surveillance, P-34A Pump Trip
2	ATC CRS	C TRM	ERV leaking
3	BOP	C	CV-4018 Temperature Control Valve Fails closed
4	BOP ATC	I	Main Turbine Controlling header pressure fails high
5	ATC	C / TS	RCS leak requiring a down power.
6	All	M	RCS LOCA resulting in Rx trip and pressure dropping below 150 psig.
7	BOP	C / CT	CV-1400 fails to open automatically.
8	ATC	C / CT	ES Channels 5 and 6 fail to actuate
9	BOP	CT	Trip all RCPs within 2 minutes of a LOSM

*(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS) Technical Specification, (CT) Critical Task

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Malfunctions after EOP entry (1-2)	2
2. Abnormal events (2-4)	4
3. Major transients (1–2)	1
4. EOPs entered/requiring substantive actions (1–2)	1
5. EOP contingencies requiring substantive actions (0-2)	1
6. EOP based Critical tasks (2–3)	3

Note: 1 of 4 crews tripped the reactor on event 4, and was not credited with a component malfunction on event 5.

NARRATIVE

This scenario starts with plant power at 35%. During turnover the BOP is directed to complete a Decay Heat Pump (P-34A) surveillance already in progress. After starting the Decay Heat Pump and establishing the required flowrate P-34A pump will trip. The crew will declare P-34A INOPERABLE and the CRS will enter T.S. 3.5.2 Condition A (ECCS).

Next, the Pressurizer ERV will start leaking which will require the ATC to recognize that the RCS pressure is below the ERV setpoint and close the isolation valve, the CRS will enter T.S. 3.4.2 Condition A for the RCS Vent Path. (PRA)

Next the temperature control valve for the Main Generator Hydrogen Coolers will fail, causing Hydrogen pressure and temperature to rise. The BOP will take TIC-4018 to manual and open to restore normal temperature.

Next the main turbine controlling header pressure instrument will fail resulting in the Main Turbine failing to control header pressure. The BOP will take manual control of the Main Turbine and the ATC will place the SG/Rx in hand and close the TBVs which responded to the failed high pressure transmitter. The crew will determine the good header pressure signal and select it for control. The Main Turbine, SG/Rx and TBVs will be returned to automatic.

Next, an RCS leak will begin to develop and continue to degrade. Initial response will require a downpower to take the unit off line in accordance with Excess RCS Leakage and Rapid Plant Shutdown AOPs. (PRA)

The RCS leak will degrade to the point resulting in an automatic reactor trip with RCS pressure stabilizing below 150 psig which will result in a LOSM (PRA) and a transition to the ESAS EOP. CV-1400, (B LPI Isolation valve) will fail to open on ES Channel 4 actuation, a critical task will be for the BOP to identify the failure and manually open CV-1400 to provide the only available LPI flow. The RCS leak will also cause Reactor Building pressure to exceed the setpoint for ES Channels 5 and 6, these channels will fail to actuate and the ATC will have a critical task of manually actuating these channels in order to provide Reactor Building Isolation.

PRA / IPE explanation:
Key Operator actions include isolating the ERV when failed open and securing RCPs.
Key equipment for potential risk increase includes ERV and LPI.
Initiating events include a LOCA.

Critical Tasks

CT-4 – Initiate LPI, the failure of CV-1400 to open coupled with the loss of P-34A results in NO LPI being available. The action of opening CV-1400 prior to completing RT-10 is the criteria for acceptable performance.

CT-19 – Maintain RB Radiation Boundary, the failure of ES Channels 5 OR 6 to actuate must be identified and corrected prior to exceeding the next ESAS actuation setpoint of 44 psig RB Pressure, in order to meet the criteria for acceptable performance

CT-2 – Trip all RCPs, RCPs should be tripped within 2 minutes of LOSM following the reactor trip.

Op-Test No.: _2016_ Scenario No.: _3__ Event No.: __1__

Event Description: ___**Perform remainder of OP-1104.004 Supplement 1 – Low Pressure Injection / Decay Heat Pump P-34A & Components Quarterly Test starting with Step 2.23.**

Time	Position	Applicant's Actions or Behavior
	BOP	Perform remainder of OP-1104.0014 Supplement 1
		NOTE When a P-34 is started, there is a pressure spike from the P-34 discharge that is sensed in the RB Spray system. This raised pressure can become trapped behind the RB Spray Pump suction check valve. It can take several hours after the P-34 is stopped to dissipate back to static pressure.
	BOP	2.23 Perform the following: • Record LPI/Decay Heat Pump (P-34A) idle suction pressure from LPI P-34A Suction Pressure (SPDS P1407) or local gauge in Table 2. • Make plant announcement for start of LPI/Decay Heat Pump (P-34A).
		NOTE Being prepared to time the stroke of CV-3840 is essential for proper data gathering.
	BOP	2.24 While timing the open stroke of LPI/Decay Heat Pump Brg Clr E-50A Inlet (CV-3840) on C18, place LPI/Decay Heat Pump P-34A handswitch (HS-1417) to START. 2.24.1 Verify LPI/Decay Heat Pump (P-34A) pump start. 2.24.2 Record stroke time in Table 6.
		2.25 IF BWST Suction piping exceeded 75 psig … n/a
		CAUTION Decay Heat pump minimum continuous flow is 80 gpm.

Op-Test No.: **2016**	Scenario No.: **3**	Event No.: **1**

Event Description: **Perform remainder of OP-1104.004 Supplement 1 – Low Pressure Injection / Decay Heat Pump P-34A & Components Quarterly Test starting with Step 2.23.**

Time	Position	Applicant's Actions or Behavior
	N/A	2.26 IF sections of the Decay Heat system piping were drained AND can NOT be vented … N/A
	BOP	2.27 Adjust DHR Cooler E-35A Outlet (CV-1428) to raise LPI/Decay Heat Pump (P-34A) discharge flow to 3000-3030 gpm.
	BOP	2.28 Normal flow indication verifies stroking of the following check valves: • BWST Out Check to P-34A and P-35A (BW-4A) • "A" DH Pump P-34A Disch Check (DH-2A) 2.28.1 Record results in Table 6.
	BOP	2.29 Check LPI/Decay Heat Room Cooler start indication on C19. 2.29.1 Record results in Table 2. 2.29.2 IF LPI/Decay Heat Room Cooler (VUC-1A) OR LPI/Decay Heat Room Cooler (VUC-1B) breaker is open, THEN N/A steps 2.30 and 2.31.

Op-Test No.: **2016**	Scenario No.: **3**	Event No.: **1**

Event Description: **Perform remainder of OP-1104.004 Supplement 1 – Low Pressure Injection / Decay Heat Pump P-34A & Components Quarterly Test starting with Step 2.23.**

Time	Position	Applicant's Actions or Behavior
	BOP	2.30 Place LPI/Decay Heat Room Cooler (VUC-1A) handswitch on C19 to OFF AND check the following: 2.30.1 LPI/Decay Heat Room Cooler (VUC-1A) stops. 2.30.2 After ~ 15 sec time delay: • LPI ROOM COOLER TROUBLE (K11-C8) alarms. • LPI/Decay Heat Room Cooler (VUC-1B) start indication on C19. 2.30.3 Record results in Table 2. 2.31 Place LPI/Decay Heat Room Cooler (VUC-1A) handswitch on C19 to AUTO. 2.31.1 Check LPI/Decay Heat Room Cooler (VUC-1A) starts. 2.31.2 Check LPI/Decay Heat Room Cooler (VUC-1B) stops. 2.31.3 Check K11-C8 clears.
EXAMINER NOTE: Insert malfunction for P-34A at the lead examiner's discretion.		
	BOP	2.32 Verify DHR Clr Service Water E-35A Inlet (CV-3822) open.
	BOP	2.33 Record highest "A" RB Spray Pump Suction Header pressure indicated using P2426 AND/OR P2429: ___________ psig
		NOTE SPDS point F1401 is the SPDS point to be recorded. SPDS point F1401S (P-34A smoothed SPDS flow) can help determine when F1401 is near average for data collection in the following step.
	BOP	2.34 Verify at least three minutes of stable operation.

Op-Test No.: **2016**	Scenario No.: **3**	Event No.: **1**
Event Description: **Perform remainder of OP-1104.004 Supplement 1 – Low Pressure Injection / Decay Heat Pump P-34A & Components Quarterly Test starting with Step 2.23.**		

Time	Position	Applicant's Actions or Behavior
	BOP	2.35 Gather data as follows: 2.35.1 Gather necessary pump data and record measured values in the appropriate spaces provided in Table 3. 2.35.2 Commence taking vibrometer readings per data sheet of this supplement.
		END OF SURVEILLANCE
Advance to next event at lead evaluator discretion		

Op-Test No.: **2016** Scenario No.: **3** Event No.: **1**		
Event Description: **P-34A Trip during Surveillance Testing**		

Time	Position	Applicant's Actions or Behavior
	BOP	Reference ACA per OP-1203.012H for K09-E8 for DH PUMP/MTR TEMP HI
		CAUTION • Maximum allowable motor bearing temperature is 190°F. • Maximum allowable pump bearing temperature is 179°F. • Maximum allowable motor winding temperature is 311°F.
		1. Determine which pump is in alarm by checking Reactor Coolant and Decay Heat Pumps Bearing Temperatures recorder (TR-6500) or Reactor Coolant, Makeup and Decay Heat Pumps Motor Winding Temperatures recorder (TR-6501) on C13.
	N/A	2. IF operating in non-ES mode, …N/A
		3. IF operating in ES mode AND both LPI loops (A and B) are in operation, THEN shut down the affected LPI Pump (P-34A) A.Determine cause of high temperature.
		4. Refer to TS 3.5.2.
EXAMINER NOTE: Proceed to next page when P-34A trips.		

Op-Test No.: 2016 Scenario No.: 3 Event No.: 1

Event Description: **P-34A Trip during Surveillance Testing** .

Time	Position	Applicant's Actions or Behavior
		P-34A Decay Heat Pump trips during surveillance testing
	BOP	Reference ACA per OP-1203.012H for K09-A7 for DECAY HEAT PUMP TRIP
	N/A	1. IF operating in normal DH mode ... N/A
	CRS	2. IF operating at power AND pump tripped during pump test, THEN verify the opposite train LPI operable. A. Enter TS 3.5.2 Condition A. B. IF train is NOT restored to operable status within 72 hours, THEN place the plant in Mode 3 within 6 hours and cooldown the RCS to ≤350°F within 12 hours.
	N/A	3. Refer to "Reclosing Tripped Individual Load Supply Breakers" section of Electrical System Operations (1107.001).
	N/A	4. IF any of the following conditions exist, … N/A
	N/A	5. IF in Mode 4 or Mode 3 with RCS ≤350°F, ... N/A
	BOP N/A	6. To clear alarm, perform either of the following: A. Place HS for affected pump in NORMAL-AFTER-STOP or PULL-TO-LOCK. B. Close breaker for affected pump (A-305 for P-34A, A-405 for P-34B).
	BOP / CRS	Discuss backing out of the procedure to restore system alignment as time allows.
	BOP	Direct WCO to realign test and recirc header based on discussion with CRS.
		END OF P-34A TRIP
Advance to next event at lead evaluator discretion		

Op-Test No.: **2016** Scenario No.: **3** Event No.: **2**

Event Description: **ERV Leaking requires ERV Isolation and entry into TRM 3.4.2**

Time	Position	Applicant's Actions or Behavior
		ERV Leakage
	BOP	Reference ACA per OP-1203.012H for K09-A1 for RELIEF VALVE OPEN
	ATC	1. Identify open relief by checking analog position indications and Hi-Alarm lights on panel C486-1.
	N/A	2. IF desired, … N/A
	CRS	3. Refer to Pressurizer Systems Failure (1203.015).
		NOTE If a relief valve is open, Quench Tank (T-42) temperature should go to saturation for its pressure.
	BOP	4. Monitor Quench Tank pressure, level and temperature.
		NOTE Temperature elements downstream of each PSV indicate valve position. Temps are available on SPDS: • PZR PSV-1002 Outlet Temp (T1027) • PZR PSV-1001 Outlet Temp (T1026) • ERV PSV-1000 Outlet Temp (T1025)
	N/A	5. IF relief valve TEs read normal … N/A
	N/A	6. IF XI-1000 keyswitch was placed in SILENCE ALARM … N/A
	CRS	Pressurizer Systems Failure (OP-1203.015) Section 1
	ATC	**1. Close Pressurizer ERV Isolation Valve (CV-1000).** A. **IF** CRS/SM desires, **THEN** override CV-1000 torque switch by holding the handswitch in the desired position.
	N/A	**2. IF ERV leakage with CV-1000 closed exceeds capability to maintain RCS pressure, THEN trip reactor AND perform Reactor Trip (1202.001) while continuing with this procedure.**

Op-Test No.: **2016** Scenario No.: **3** Event No.: **2** Event Description: **ERV Leaking requires ERV Isolation and entry into TRM 3.4.2**		
Time	**Position**	**Applicant's Actions or Behavior**
	CRS	**3. <u>IF</u> closing CV-1000 stops leak, <u>THEN</u> perform the following:** A. Continue power operations with ERV isolated. B. Notify Senior Manager, Operations. C. Log in station log and on plant status board.
	CRS	**5. <u>IF</u> ERV (PSV-1000) is inoperable, <u>OR</u> ERV Isolation Valve (CV-1000) is inoperable, <u>THEN</u> perform the following:** A. Close ERV Isolation. B. Maintain ERV vent path closed <u>AND</u> refer to TRM 3.4.2. C. Place caution tag on CV-1000 handswitch stating, "Use as required by EOP and then only as a last resort". D. Initiate a Condition Report.
<u>EXAMINER NOTE</u>: CRS Should enter TRM 3.4.2 Condition A. Step 7 directs him to reference T.S. 3.4.1, however he should not enter the specification.		
	CRS	**6. <u>IF</u> CV-1000 is closed, <u>THEN</u> perform the following:** A. Assess risk using Risk Assessment Guidelines (COPD-24). B. Update System Alignments in EOOS to reflect CV-1000 closed.
	CRS	**7. Refer to "RCS Pressure, Temperature and Flow DNB Surveillance Limits" of the ANO1 COLR (TS 3.4.1).**
		END OF ERV LEAKAGE
Advance to next event at lead evaluator discretion. NOTE alarm for next event takes 5 minutes to build in, consider inserting malfunction while applicant is reviewing TRM and T.S.		

Op-Test No.: 2016-1 Scenario No.: 3 Event No.: 3

Event Description: **CV-4018 Temperature Control Valve Fails**

Time	Position	Applicant's Actions or Behavior
		Reference ACA 1203.012C for K05-D5 for H2/SEAL OIL TROUBLE.
	BOP	1. Observe Generator Monitoring System CRT (QS-9504) or Plant Computer for alarm messages.
	Field Operator	2. Go to H_2 Control Panel (M27) alarm reflash unit (K1648) to determine cause of alarm.
	Field Operator	3. IF no alarm is visible on K1648 reflash unit, … N/A
	CRS	4. IF alarm is indicated on K1648, THEN refer to Attachment B for further instructions.
BOOTH: Inform CRS that the cause of alarm is HYDROGEN PRESSURE HI		
	N/A	1. IF cause of reduced hydrogen pressure is known, … N/A
	BOP	2. Monitor H_2 temperature and cooling water flows while performing the following: A. IF H_2 pressure high, THEN vent hydrogen from generator by performing "Main Generator Pressure and Purity Adjustments" of 1106.002 Exhibit A until the high pressure alarm clears and system is within allowable operating range.
	N/A	3. IF H_2 leakage is suspected, … N/A

EXAMINER NOTE: Crew should identify that H2 temperature is high and take appropriate actions as addressed on following pages.

Op-Test No.: **2016-1** Scenario No.: **3** Event No.: **3**

Event Description: **CV-4018 Temperature Control Valve Fails**

Time	Position	Applicant's Actions or Behavior
		Reference ACA 1203.012C for K04-B6 for GENERATOR H2 TEMPERATURE HI
	BOP	1. Check the following to determine the point in alarm: • Generator and Coolers Gas Outlet Temperatures (TR-9001) • Plant Monitoring System Dynamic Alarm Display
	BOP	2. For generator temperature alarms, perform the following as applicable: A. IF any Gen H_2 Cooler Outlet (TR-9001, points 7 thru 10) is >125°F, THEN perform the following: • IF all hydrogen coolers have high or rising temperature, AND Generator H2 Temp Control CV-4018 (TIC-4018) on C19 is NOT at setpoint, THEN place TIC-4018 in "M" (manual). (1) Rotate TIC-4018 MAN ADJ knob to adjust total ACW flow to coolers as needed. (2) Inspect Generator Hydrogen Temperature Control Valve (CV-4018) locally.
BOOTH: Delete malfunction when TIC-4018 is taken to manual to allow control from the control room.		
EXAMINER NOTE: Once the BOP takes manual control of the TIC the malfunction will be removed which will allow the BOP to control temperature. The rest of the steps will not be necessary and the next event can be initiated.		

Op-Test No.: **2016** Scenario No.: **3** Event No.: **4**

Event Description: **Main Turbine Controlling Header Pressure Transmitter fails high during downpower and requires intervention by the BOP to control the main turbine. The ATC will be required to close TBVs. The crew will determine and select the good transmitter for control.**

Time	Position	Applicant's Actions or Behavior
		Controlling Header Pressure Transmitter fails high
		Reference ICS Abnormal Operations AOP (OP-1203.001) Section 7, Selected Turbine Header Pressure High
		1. Perform the following:
	BOP	• Verify Turbine in OPER AUTO <u>OR</u> TURB MAN control. - **<u>IF</u>** Turbine in OPER AUTO, **<u>THEN</u>** perform the following: A. While monitoring SG pressure, adjust SETTER as necessary to stabilize steam header pressure and RCS Pressure. B. Depress GO pushbutton <u>AND</u> release. C. Verify REFERENCE matches SETTER. - **<u>IF</u>** Turbine in TURB MAN, **<u>THEN</u>** while monitoring SG pressure, operate GV pushbuttons as necessary on C01 Lower Operator Console to stabilize steam header pressure and RCS pressure.
	ATC	• Verify SG/RX Demand H/A station in HAND.
	ATC	• Place BOTH TURB BYP Valve H/A stations in HAND.
	ATC	**2. <u>IF</u> open, <u>THEN</u> while monitoring turbine load and SG pressure close LOOP A and LOOP B TURBINE BYPASS VALVES.**
	ATC	**3. Select the good Turbine Header Pressure instrument for indication.** • Steam Header B PT-2633 (NNI-Y)
	N/A	**4. Lower SG/RX Demand H/A station as necessary to stabilize power < 100%.**

Op-Test No.: 2016 Scenario No.: 3 Event No.: 4

Event Description: **Main Turbine Controlling Header Pressure Transmitter fails high during downpower and requires intervention by the BOP to control the main turbine. The ATC will be required to close TBVs. The crew will determine and select the good transmitter for control.**

Time	Position	Applicant's Actions or Behavior
		5. Proceed as directed by CRS/SM.
EXAMINER NOTE: The following steps will return ICS to automatic control.		
EXAMINER CUE: If the crew pursues taking all of ICS to manual per Step 8.0, direct them as SM to take individual stations to Auto, rather than taking all major stations to hand then auto.		
		9.0 Turbine Control Transfer to Integrated Control
	ATC	9.1 Verify main steam header pressure is at the setpoint selected on Header Pressure Controlling substation.
	BOP	9.2 Monitor Governor Valve demand and the following PMS/PDS points for stable conditions: • IC57 TVGV XFER TO SEL HDR PRES (PPAS) • EH02 GOVERNOR VLV DEMAND (PPAS) • ZT6631 GOVERNOR VLV #1 POSITION (PPAS) • ZT6662 GOVERNOR VLV #2 POSITION (PPAS) • ZT6628 GOVERNOR VLV #3 POSITION (PPAS) • ZT6661 GOVERNOR VLV #4 POSITION (PPAS)

Op-Test No.: **2016-1** Scenario No.: **3** Event No.: **4**

Event Description: **Main Turbine Controlling Header Pressure Transmitter fails high and requires intervention by the BOP to control the main turbine. The ATC will be required to close TBVs. The crew will determine and select the good transmitter for control and will continue the downpower with the SG/RX Demand in manual.**

Time	Position	Applicant's Actions or Behavior
		CAUTION • If Turbine Bypass Valves are open in AUTO and unit load demand rises above 15% (~135 MWe), then the valves will be rapidly closed, possibly creating a significant pressure transient.
	N/A	9.3 IF Unit Load Demand is approaching 15% ... N/A
		NOTE • If header pressure error is >±50 psig, then Turbine Control will not transfer into INTEG CONTROL. • When placing the turbine in integrated control, instabilities occurred when Reference Counter was between 60% and 75%.
	BOP	9.4 WHEN Turbine Bypass Valves are fully closed AND 50 psi bias is applied, THEN verify Turbine Control in OPER AUTO. 9.4.1 Closely monitor Turbine Header Pressure and PMS/PDS for indications of turbine instability.
	BOP	9.5 WHEN turbine header pressure is at setpoint (±5 psi) AND stable (rate of change <10 psi/minute), THEN transfer turbine controls as follows: 9.5.1 Depress INTEG CONTROL button on C33. 9.5.2 Check OPER AUTO and TURBINE MANUAL lamps off. 9.5.3 Check INTEG CONTROL lamp lit. 9.5.4 IF UNIT MASTER IN TRACK (K07-A1) is in alarm due to turbine mode only, THEN check UNIT MASTER IN TRACK (K07-A1) clear.
	BOP	9.6 Verify turbine control is steady.

Op-Test No.: **2016-1**	Scenario No.: **3**	Event No.: **4**

Event Description: **Main Turbine Controlling Header Pressure Transmitter fails high and requires intervention by the BOP to control the main turbine. The ATC will be required to close TBVs. The crew will determine and select the good transmitter for control and will continue the downpower with the SG/RX Demand in manual.**

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE: The following steps will return SG/RX Demand to Automatic		
		14.0 SG/RX Demand Transfer to Auto
		NOTE • With SG/RX Demand in HAND and when plant efficiency changes occur (such as changes in condenser vacuum or circ water flow), changes in generated megawatts will create a difference between POS and MEAS VAR. • If MW & PRESS COMP ULD (IC01) and SG/RX H/A Station Output (IC03) are approximately equal, then a bumpless transfer should occur when SG/RX Demand is placed into AUTO. • POS reads SG/RX Demand H/A station output (hand demand, analog memory) 0-1000 MWe (IC03). • MEAS VAR reads rate-limited ULD (before calibrating integral) 0-1000 MWe (UL02).
	ATC	14.1 Check that POS and MEAS VAR demands are approximately equal (normally 2% or less).
	BOP	14.2 IF PDS is available, THEN check that SG/RX Demand the following are within 30 MW of each other: • MW & PRESS COMP ULD, IC01 (input) • SG/RX H/A Station Output, IC03 (output)
		CAUTION If POS and MEAS VAR differ significantly (>3% or >30 MW), placing SG/RX Demand in AUTO can cause a plant transient. If deviation cannot be corrected, then an ICS auto-balancing circuit malfunction might exist.

Op-Test No.: **2016-1** Scenario No.: **3** Event No.: **4** Event Description: **Main Turbine Controlling Header Pressure Transmitter fails high and requires intervention by the BOP to control the main turbine. The ATC will be required to close TBVs. The crew will determine and select the good transmitter for control and will continue the downpower with the SG/RX Demand in manual.**		
Time	**Position**	**Applicant's Actions or Behavior**
		CRITICAL STEP
	ATC	14.2.1 IF significant error exists, such as one of the following: • >3% between POS and MEAS VAR • >30 MW between IC01 and IC03 THEN perform one of the following: • Notify CRS/SM AND obtain permission prior to proceeding. • Place applicable H/A stations in manual and re-perform applicable sections of this procedure.
		14.3 Place SG/RX Demand H/A station in AUTO.
		19.1 Turbine Bypass Valve Transfer to Auto – PREFERRED Method.
		CAUTION To ensure bumpless transfer, a transfer of H/A station from HAND to AUTO is not made without first minimizing error between MEAS VAR and POS.
		NOTE POS reads hand demand (analog memory). MEAS VAR reads biased header pressure error (50% = null).
		19.1.1 Verify MEAS VAR reads less than or equal to 50%.

Op-Test No.: **2016-1** Scenario No.: **3** Event No.: **4**

Event Description: **Main Turbine Controlling Header Pressure Transmitter fails high and requires intervention by the BOP to control the main turbine. The ATC will be required to close TBVs. The crew will determine and select the good transmitter for control and will continue the downpower with the SG/RX Demand in manual.**

Time	Position	Applicant's Actions or Behavior
		19.1.2 Verify Turb Byp Valves are fully closed: • Loop A (CV-6689, CV-6690) • Loop B (CV-6687, CV-6688) 19.1.3 Place applicable Turb Byp Valves H/A station in AUTO. 19.1.4 Verify Header Pressure and Turbine Control remain steady.

EXAMINER NOTE: Once the crew has stabilized the plant and returned ICS to auto, ready to proceed to the next event.

Advance to next event

Op-Test No.: **2016** Scenario No.: **3** Event No.: **5**		
Event Description: **RCS Leak develops requiring plant shutdown**		

Time	Position	Applicant's Actions or Behavior
		RCS Hotleg leak
	BOP	Reference ACA per OP-1203.012I for K10-B2 for PROC MONITOR RADIATION HI
	BOP	1. Check panels C486-2 and C25 (Bays l, 2, 3) to determine which process monitor is in alarm. A. IF alarm is on RB Atmos Gaseous Monitor (RI-7461), THEN GO TO step 13.
EXAMINER NOTE: Applicants can also determine cause of alarm using the Plant Computer and may not get into the ACA rather once they determine the alarm is from RI-7460 proceed directly to Excess RCS Leakage AOP (OP-1203.039). Refer to the Entry conditions listed on the next page, which justifies why it is acceptable to skip the ACA guidance of leak investigation per OP-1103.013.		
		NOTE • HIGH alarm condition on RI-7461 is indicated by a red lamp and a flashing "H" on monitor display. • Alarm setpoint is adjustable at RI-7461 on C25 and is set per Radiation Monitoring System Check and Test (1305.001), Supplement 5. • Alarm setpoint for RI-7461 can be read by repeatedly pressing the MODE key until HighAlm value is displayed.
	BOP	13. IF RB Atmos Gaseous Monitor (RI-7461) radiation is high, THEN perform the following: A. Compare counts to High Alarm setpoint by depressing MODE key until HighAlm value is displayed. B. IF alarm is caused by instantaneous spiking … N/A C. IF alarm is due to rise in activity and confirmation is warranted, … N/A

Op-Test No.: **2016**	Scenario No.: **3**	Event No.: **5**
Event Description: **RCS Leak develops requiring plant shutdown**		

Time	Position	Applicant's Actions or Behavior
		D. IF alarm is confirmed, THEN perform the following: • IF RCS is > 200°F, THEN perform RCS Leak Detection (1103.013). IF reactor building is open for access,... N/A E.Monitor RDACs. • IF rising trend is observed, THEN notify Chemistry to perform Offsite Dose Projections (1904.002). Notify SM to review Emergency Action Level Classification (1903.010).
	CRS	Excess RCS Leakage AOP (OP-1203.039)
		ENTRY CONDITION
		NOTE This procedure is intended for RCS leak rates which pose a threat to plant operations but do not require use of Emergency Operating Procedures. Small RCS leaks which are not an immediate threat to plant operations are addressed in RCS Leak Detection (1103.013).
		One or more of the following: • Unexplained drop in makeup tank level • Unexplained mismatch between RCS in-flow and out-flow • Unexplained rise in reactor building temperature, pressure, or sump level • Unexplained rise in reactor building dew point (PMS/PDS M6278, M6278RTD, M6279, M6279RTD) • RB Leak Detector (RX-7460) high alarm(s) or rising activity

Op-Test No.: **2016**	Scenario No.: **3**	Event No.: **5**
Event Description: **RCS Leak develops requiring plant shutdown**		

Time	Position	Applicant's Actions or Behavior
	N/A	**1. IF HPI is required to maintain RCS inventory AND SG tube leakage is not indicated, THEN trip the reactor AND perform Reactor Trip (1202.001), while continuing with this procedure.**
	BOP	**2. IF desired, THEN open BWST T3 Outlet (CV-1407) to OP HPI pump.**
	ATC	**3. IF desired, THEN perform one of the following:** • Reduce letdown flow by closing Orifice Bypass (CV-1223) • Isolate Letdown by closing either: – Letdown Coolers Outlet (RCS) (CV-1221) **OR** – Letdown Coolers Outlets (RCS): ♦ CV-1214 ♦ CV-1216
	CRS	**4. IF location of leak is known, THEN perform the applicable step(s):** • RB Sump Inleakage step 5
	BOP	**5. Monitor RB parameters:** • Humidity (PMS/PDS M6278, M6278RTD, M6279, M6279RTD) • RB temperature • RB pressure • RB Sump level

Op-Test No.: **2016**	Scenario No.: **3**	Event No.: **5**
Event Description: **RCS Leak develops requiring plant shutdown**		

Time	Position	Applicant's Actions or Behavior
		A. **IF** leakage into RB Sump is indicated, **THEN** perform the following: 1) Consider performing Repetitive Tasks (1202.012), Maximize RB Cooling (RT-9). 2) Determine RCS Leakrate (Exhibit 1). 3) **GO TO step 16**.
	BOP	Determine RCS Leakrate per Exhibit 1
EXAMINER NOTE: RCS leak is greater than the T.S. limit of 1 gpm unidentified and the CRS should enter T.S. 3.4.13 Condition A. Final leak rate for this event is ~35 gpm.		
	CRS	**16. IF total RCS leakage is in excess of that allowed by Tech Spec 3.4.13 AND poses an immediate threat to plant operations, THEN perform the following:** **A. IF reactor is Critical, THEN commence plant shutdown per Rapid Plant Shutdown (1203.045).**
	CRS	**Commence plant shutdown per Rapid Plant Shutdown. Section 1, Rapid Plant Shutdown Without Small SG Tube Leak**
		NOTE • Shutdown rate shall be based on plant conditions and safety considerations. Rate may be raised or lowered at any time as plant conditions necessitate. • Recommended shutdown rates for RCS leaks inside containment with no additional complications are as follows: - < 50 gpm -- 0.5 to 5% per minute - ≥ 50 gpm -- 5 to 10% per minute • Use of this procedure may be terminated at any point if a complete shutdown is not required. • Net Generation can be monitored using PMS point JNETGEN. • Steady state reactivity controls per ANO Reactivity Management Program (COPD-030) are not applicable.

Op-Test No.: **2016** Scenario No.: **3** Event No.: **5**

Event Description: **RCS Leak develops requiring plant shutdown**

Time	Position	Applicant's Actions or Behavior
	ATC	**1. Commence power reduction at 0.5 to 10% per minute.**
	CRS	• **IF** power reduction is **NOT** due to automatic runback, **THEN** verify ATC has been given a specific end point for the power reduction and rate of desired power change.
	N/A	• **IF** power reduction is due to automatic runback, … N/A
	CRS	• Instruct ATC to report power level at CRS directed frequency.
	BOP	• **IF** power reduction is due to RCS leak or steam leak inside RB, **THEN** maximize RB cooling per RT-9.
	BOP	• **IF** necessary to maintain Makeup tank level, **THEN** open BWST T3 Outlet to operating HPI Pump (CV-1407 or CV-1408) **AND** minimize or isolate Letdown.
	N/A	• **IF** power reduction is due to Dispatcher request, … N/A
	ATC / BOP	**2. Monitor ICS and EHC subsystems for proper integrated response.** • Manual control of ICS or EHC subsystems may be initiated at any time deemed appropriate by the operator. • As MFW Block Valve Closure setpoint is approached (~45% FW Loop Demand), monitor the following ICS feedwater PDS points (as a minimum): – FW23, MFW VLV CONTROL OUT LPA – FW27, MFW VLV CONTROL OUT LPB – FW19, LIMITED MFW FLW ERR LPA (MFW flow error Loop A) – FW20, LIMITED MFW FLW ERR LPB (MFW flow error Loop B)

Op-Test No.: 2016	Scenario No.: 3	Event No.: 5
Event Description: **RCS Leak develops requiring plant shutdown**		

Time	Position	Applicant's Actions or Behavior
		• Upon closure of each MFW Block, check ICS feedwater PDS points respond as expected: – FW23 and FW 27 track together and lower with power reduction. – FW19 and FW20 remain near zero. • **IF** PDS points do **NOT** respond as expected with MFW Block closed, … N/A • **IF** desired to restore automatic control of a subsystem, **THEN** refer to Integrated Control System (1105.004). • **IF** desired to stop downpower above final ULD setpoint, **THEN** perform Operations of SG/RX Demand Hand/Auto Station (Exhibit 1) of this procedure.
EXAMINER NOTE: The following step allows for stopping the downpower if cause has been corrected, that is not the case so Step 3 is N/A.		
	N/A	**3. IF plant has been stabilized with the reactor critical, THEN perform the following:**
EXAMINER NOTE: Insert next event at lead examiner discretion during the downpower. The downpower will continue to take the plant off line.		
		7. WHEN Main Generator output ≤ 350 MW, AND main turbine will be shutdown, THEN perform the following:
	ATC	A. Set Lo-Load Limit at minimum.
	BOP	B. Open Turbine Bypass Condenser Sprays (HS-2858 on C02).
	BOP	C. Verify HP Turbine Drains open (HS-6627 on C02).
Advance to next event at lead evaluator discretion		

Op-Test No.: **2016** Scenario No.: **3** Event No.: **6**

Event Description: **Large RCS Leak results in an automatic Reactor Trip, LOSM and ESAS Actuation. The leak is large enough to cause RCS pressure to stabilize below 150 psig.**

Time	Position	Applicant's Actions or Behavior
		Large RCS Leak
	ATC	**1. Depress Reactor Trip PB.** A. Verify all rods inserted **AND** reactor power dropping.
	BOP	**2. Depress Turbine trip PB.** A. Check Turbine throttle and governor valves closed.
	ALL	**3. Check adequate SCM.**
	BOP Critical Task	3. Check elapsed time since loss of adequate SCM **AND** perform the following: A. **IF** ≤ 2 minutes have elapsed, **THEN** trip all RCPs: • P32A • P32C • P32B • P32D B. **IF** > 2 minutes have elapsed, **THEN** leave currently running RCPs on. C. Advise Shift Manager to implement Emergency Action Level Classification (1903.010). D. Perform the following: 1) **IF** 4160V bus A1 or A2 is energized, **THEN GO TO 1202.002, "LOSS OF SUBCOOLING MARGIN"** procedure. 2) **IF** only EDG power is supplying 4160V buses, **THEN GO TO 1202.007, "DEGRADED POWER"** procedure.

Op-Test No.: **2016**	Scenario No.: **3**	Event No.: **6**

Event Description: **Large RCS Leak results in an automatic Reactor Trip, LOSM and ESAS Actuation. The leak is large enough to cause RCS pressure to stabilize below 150 psig.**

Time	Position	Applicant's Actions or Behavior
		Transition to Loss Of Subcooling Margin EOP
		CAUTION Tripping all RCPs > 2 minutes after loss of adequate SCM could cause reactor core to become uncovered.
	BOP BOP ATC CRS	**1. Check elapsed time since loss of adequate SCM <u>AND</u> perform the following:** A. <u>**IF**</u> ≤ 2 minutes have elapsed, <u>**THEN**</u> trip all RCPs: P-32A P-32C P-32B P-32D B. Initiate full HPI (RT-3). 1) <u>**IF**</u> Makeup Tank level drops below 18", <u>**THEN**</u> close Makeup Tank Outlet (CV-1275). C. Verify proper EFW actuation and control (RT-5). D. Direct Control Board Operators to monitor floating steps.
	ATC	**2. <u>IF</u> a feed source other than MFW is available, <u>THEN</u> trip both MFW pumps:** • **A Main Feed Pump** • **B Main Feed Pump**
	ATC	**3. Check ESAS ACTUATION alarms clear on K11.**
	ATC	**4. Check RCS press ≥ 150 psig.**

Op-Test No.: **2016** Scenario No.: **3** Event No.: **6**		
Event Description: **Large RCS Leak results in an automatic Reactor Trip, LOSM and ESAS Actuation. The leak is large enough to cause RCS pressure to stabilize below 150 psig.**		

Time	Position	Applicant's Actions or Behavior
	N/A	5. IF RCS T-cold is < 540°F and dropping AND RB and AUX Building Sump levels are stable AND SCM is adequate, THEN GO TO 1202.003, "OVERCOOLING" procedure.
	ATC	**6. Isolate Pressurizer Spray Line as follows:** A. Place Pressurizer Spray Control Mode in MAN **AND** verify Pressurizer Spray (CV-1008) closed (modulating valve). B. Close Pressurizer Spray Isolation (CV-1009).
	ATC	**7. IF both of the following conditions exist:** • **HPI cooling is not in progress** • **ERV was not opened by procedure to intentionally depressurize the RCS** **THEN verify Electromatic Relief ERV Isolation (CV-1000) closed.**
	ATC	8. Check Nuclear Loop ICW process monitor alarm clear.
	N/A	9. IF CET temps are superheated AND moving away from the saturation line, THEN GO TO 1202.005, "INADEQUATE CORE COOLING" procedure.
	ATC	**10. Check SG tube integrity (RT-18).**
	ATC	**11. IF SCM is adequate,** **THEN control RCS press low within limits of Figure 3 (RT-14).**

Op-Test No.: **2016** Scenario No.: **3** Event No.: **6**

Event Description: **Large RCS Leak results in an automatic Reactor Trip, LOSM and ESAS Actuation. The leak is large enough to cause RCS pressure to stabilize below 150 psig.**

Time	Position	Applicant's Actions or Behavior
	ATC	**12. Check RCS press remains ≥ 150 psig.**
	CRS	12. **GO TO 1202.010, "ESAS"** procedure.
	CRS	Transition to ESAS EOP
	ATC	1. Check adequate SCM.
	CRS BOP ATC	**2. Direct Control Board Operators to perform the following:** • **Verify proper ESAS actuation (RT-10)** • Monitor floating steps
	BOP Critical Task	**During performance of RT-10 the BOP will identify that CV-1400 has failed to open**
EXAMINER NOTE: Identification and correction of CV-1400 failure is a ***CRITICAL TASK*** that must be completed before announcing RT-10 is complete.		
	ATC	**3. IF Makeup Tank level drops below 18", THEN close Makeup Tank Outlet (CV-1275).**
	N/A	**4. IF ESAS actuated on high RB press alone** … N/A
	ATC	**5. Isolate Pressurizer Spray Line as follows:** A. Place Pressurizer Spray Control Mode in MAN **AND** verify Pressurizer Spray valve (CV-1008) closed (modulating valve). B. Close Pressurizer Spray Isolation (CV-1009).
	ATC	**6. IF the following conditions exist:** • **HPI cooling is not in progress** • **ERV was not opened by procedure to intentionally depressurize the RCS** **THEN verify Electromatic Relief ERV Isolation (CV-1000) closed.**
	ATC	7. Check NUC ICW Monitor (RI-2236) alarm clear.
	ATC	**8. Check SG tube integrity (RT-18).**

Op-Test No.: **2016**	Scenario No.: **3**	Event No.: **6**

Event Description: **Large RCS Leak results in an automatic Reactor Trip, LOSM and ESAS Actuation. The leak is large enough to cause RCS pressure to stabilize below 150 psig.**

Time	Position	Applicant's Actions or Behavior
	ATC	**9. Check RCS press remains > 150 psig.**
	CRS	9. **GO TO step 13.**
		NOTE Aligning Pressurizer AUX Spray to LPI system before going on sump recirc reduces personnel exposure should the lineup be required for boron precipitation mitigation at a later time. Transfer to RB Sump suction must commence when BWST level reaches 6', even if this alignment is not complete.
	CRS	**13. Dispatch an operator to perform Decay Heat Removal Operating Procedure (1104.004), "DH System Aux Spray Alignment Prior to RB Sump Recirc" section.** A. **IF** BWST level reaches 6' before alignment is complete, **THEN** notify dispatched operator to exit the Aux Bldg, regardless of alignment status, until transfer to RB sump suction is complete and radiation levels can be determined.
	BOP	**14. Check LPI flow meets the following criteria:** **2 LPI pumps**: >2800 gpm/pump **1 LPI pump**: >3050 gpm/pump A. Override all HPI pumps: • P36A • P36B (C18) • P36B (C16) • P36C

Op-Test No.: **2016** Scenario No.: **3** Event No.: **6**

Event Description: **Large RCS Leak results in an automatic Reactor Trip, LOSM and ESAS Actuation. The leak is large enough to cause RCS pressure to stabilize below 150 psig.**

Time	Position	Applicant's Actions or Behavior
	BOP	B. Perform the following to secure HPI: 1) Start AUX Lube Oil pumps for running HPI pumps: **P36A** / P64A **P36B** / P64B **P36C** / P64C 2) Stop running HPI pumps: • P36A • P36B • P36C 3) Override **AND** close all HPI Block valves. P36A/B: CV-1219, CV-1220, CV-1278, CV-1279 P36B/C: CV-1227, CV-1228, CV-1284, CV-1285 4) Verify RCP Seal INJ Block (CV-1206) closed.
	BOP	C. Dispatch an operator to isolate CFTs as follows: 1) Remove Danger Tag, unlock **AND** close Core Flood Tank Outlet supply breakers: • B5661 • B5545 2) Close Core Flood Tank Outlet valves: • CV-2415 • CV-2419 3) Open **AND** lock Core Flood Tank Outlet supply breakers: • B5661 • B5545

Op-Test No.: **2016**	Scenario No.: **3**	Event No.: **6**

Event Description: **Large RCS Leak results in an automatic Reactor Trip, LOSM and ESAS Actuation. The leak is large enough to cause RCS pressure to stabilize below 150 psig.**

Time	Position	Applicant's Actions or Behavior
	BOP	D. Verify all RCPs secured.
	ATC	E. Perform the following to secure EFW: 1) Place EFW pump (P7B) in PULL-TO-LOCK. 2) Place EFW pump Turbine K3 Steam Admission valves in MANUAL **AND** close: • CV-2613 • CV-2663
	ATC	F. Close Main Feedwater Isolation valves: • CV-2630 • CV-2680
	ATC	G. Close MSIVs: • CV-2691 • CV-2692
		H. **GO TO step 18.**
		CAUTION Full flow from both trains of HPI, LPI, and RB Spray can reduce BWST level to 6' within 25 minutes of ESAS actuation.

Op-Test No.: **2016** Scenario No.: **3** Event No.: **6**		
Event Description: **Large RCS Leak results in an automatic Reactor Trip, LOSM and ESAS Actuation. The leak is large enough to cause RCS pressure to stabilize below 150 psig.**		
Time	**Position**	**Applicant's Actions or Behavior**
	BOP	**18. Before BWST level reaches 6', perform the following:** A. Verify RB Sump Outlets open: • CV-1414 • CV-1415
	CRS	B. Evacuate all unnecessary personnel from Auxiliary Building in preparation for RB sump recirculation.
	BOP	C. **IF** RB Spray has actuated, **THEN** verify RB Spray flow throttled to maintain 1050 to 1200 gpm per train.
	BOP	D. Verify both Low Pressure Injection (Decay Heat) Pumps running: • P34A • P34B 1) **IF** either Low Pressure Injection (Decay Heat) Pump is unavailable, **THEN** stop associated HPI pump. P34A: P36A/B; P34B: P36B/C
	BOP	E. **IF** HPI is in service, **THEN** verify both Decay Heat Supply to Makeup Pump Suctions open: • CV-1276 • CV-1277 1) **IF** CV-1276 or CV-1277 fails to open, **THEN** stop associated HPI pump: CV-1276: P36A/B; CV-1277: P36B/C

Op-Test No.: **2016** Scenario No.: **3** Event No.: **6**

Event Description: **Large RCS Leak results in an automatic Reactor Trip, LOSM and ESAS Actuation. The leak is large enough to cause RCS pressure to stabilize below 150 psig.**

Time	Position	Applicant's Actions or Behavior
		WARNING If core is significantly damaged, initiation of sump recirculation may cause high radiation in areas near HPI, LPI, and RB Spray system piping.
		CAUTION • Failure to throttle RB Spray before initiating sump recirc may result in inadequate pump suction press. • Full flow from both trains of HPI, LPI, and RB Spray can remove 6' of water from BWST in 5 minutes. • The next step is a time-critical action. Do not delay performance of this step for administrative reasons.
	BOP	**19. WHEN BWST level reaches 6', THEN shift to RB sump suction per Attachment 1.**
Next event commences when RB pressure exceeds 4 psig.		

Op-Test No.: **2016**	Scenario No.: **3**	Event No.: **8**
Event Description: **ES Channel 5 and 6 fail to actuate**		

Time	Position	Applicant's Actions or Behavior
		ES Channels 5 and 6 fail to actuate
EXAMINER NOTE: ES Channels 5 and 6 actuate based on Reactor Building pressure and should have actuated at 4 psig (18.7 psia).		
	Crew	Recognize that ES Channels 5 and 6 failed to actuate.
	ATC Critical Task	Actuate Channels 5 OR 6
	BOP	Perform RT-10 for Channels 5 and 6 components.
EXAMINER NOTE: Manual actuation of ES Channels 5 OR 6 is a ***CRITICAL TASK* that must be completed prior to exceeding the setpoint for channels 7 – 10 which is Reactor Building pressure of 44.7 psia.**		
When RT-10 is complete and the CRS has transitioned to ESAS Freeze at lead evaluator discretion		

SUPPORTING DOCUMENTATION FOR CRITICAL TASKS

ANO-1 has developed a document that utilizes technical basis documents and input from Operations Management to define acceptable performance for critical tasks. The following pages come from that document.

At the end of each critical task page, is the applicable criteria discussion pertaining to 2016-1 exam.

CT-4 **Initiate LPI**

CT based on: Add/Maintain appropriate RCS water mass

TBD Description
Initiate LPI anytime LPI initiation setpoints are reached.

TBD Conditions
LPI initiation setpoints reached.

Associated GEOG Bases:

If a larger LOCA occurs (e.g., LOCAs that reduce and maintain RCS pressure < LPI pump discharge pressure) the RCS will rapidly cool and depressurize. In this situation LPI along with HPI and CF will provide inventory for core recovery as well as long term core cooling.

Proper operation of the LPI system is provided as soon as LPI is actuated whether manually or automatically. This includes proper valve alignment. If LPI is actuated when RCS pressure is > shutoff head of the LPI pumps, then there will be no LPI flow to the RCS until RCS pressure decreases below the operational pressure of the LPI pumps.

ANO Version(s)
(1) P-34A LPI Pump must be started before commencing sump recirculation alignment. (The sump recirculation alignment will make P-34B not available; therefore, P-34A is required to maintain LPI safety function.)
(2) ESAS Channels 3 and 4 should be manually actuated prior to actuation of ES Channels 7-10 due to Hi-Hi RB Pressure (44 psig).
(3) At least one LPI must be manually started before RT10 is announced as being completed.

SES used

Justification for ANO
(1) P-34A LPI Pump must be started before commencing sump recirc alignment. (The sump recirc alignment will make P-34B not available; therefore, P-34A is required to maintain LPI safety function.)
(2) Actuation of ES Channels 3&4 prior to reaching the next ESAS actuation set point of 44psig RB pressure provides a reasonable time for the crew to determine that proper safety system actuation did not occur and then to manually actuate the failed channels to ensure LPI safety function is met.
(3) The ESAS start signals to P34A/B are failed in this scenario. Starting at least one LPI pump prior to RT-10 being announced as complete provides a reasonable time for the crew to utilize proper procedure guidance to restore LPI safety function.

For the 2016-1 ILO NRC Exam criteria (3) is applicable. The failure of CV-1400 to open coupled with the loss of P-34A results in NO LPI being available. The action of opening CV-1400 prior to completing RT-10 is the criteria for acceptable performance.

CT-19 Maintain RB Radiation Boundary (includes SG tubes)

CT based on: Isolate possible RCS leak paths

TBD Description
Operate RB cooling and spray systems to maintain RB temperature and pressure within normal limits.

TBD Conditions
Operation of RB isolation and cooling systems when their respective actuation setpoints are reached or RB atmosphere is being degraded due to HPI cooling.

Associated GEOG Bases:

Operating the RB emergency cooling system will decrease the RB pressure and temperature. Operating the RB spray system will reduce RB pressure and temperature. RB spray is expected to scrub airborne fission products from the RB atmosphere and retain them in the sump water. Operation of the RB isolation system assures containment integrity.

SG shell cooling concerns arise when one SG is isolated, for both forced and natural circulation cooldowns. In dry idle SGs, the shell is no longer cooled by steam and FW flow but rather by ambient losses. Limits pertinent to cooldowns and shell cooling are:

Normal tensile tube to shell ΔT (tubes colder): $< 100°F$

Compressive tube to shell ΔT (shell colder): $< 50°F$ when RCS pressure < 1800 PSIG and tube temperature $> 500°F$; $< 60°F$ all other conditions

Emergency tensile tube to shell ΔT (tubes colder): $\leq 150°F$[6]

SG tube to shell tensile stresses are a function of both temperature differential and primary to secondary pressure differential. Therefore, reducing the primary to secondary differential pressure, by minimizing SCM, will aid in reducing the overall tube tensile stresses

ANO Version(s)
(1) ES channel 3 actuated before RT-10 is reported as complete
(2) ESAS should be manually actuated before Reactor Building pressure exceeds 44 PSIA (Prior to ESAS Channels 7 through 10 auto actuating).
(3) ESAS Channels 3 and 4 should be manually actuated within four minutes of ESAS Channels 1 and 2 actuating.

SES used

Justification for ANO:

(1) ES Channel 3 will fail to actuate and require operator action to ensure that the RB Radiation boundary is protected. Performing this action prior to announcement of RT-10 complete provides a reasonable time for the crew to utilize procedural guidance to determine that the channel is failed and to implement actions to correct.

(2) Actuation of ES Channels 1-6 is critical to provide the required safety functions associated with those respective channels when automatic actuation fails to occur. Performing this action prior to the next actuation setpoint of 44# provides a reasonable time for the crew to determine that the safety functions are not being met and to implement actions to correct.

(3) Actuation of ES Channels 3&4 prior to reaching the next ESAS actuation set point of 44psig RB pressure provides a reasonable time for the crew to determine that proper safety system actuation did not occur and then to manually actuate the failed channels to ensure Diverse Containment function is met.

For the 2016-1 ILO NRC Exam criteria (2) is applicable. The failure of ES Channels 5 & 6 to actuate must be identified and corrected prior to exceeding the next ESAS actuation setpoint of 44 psig RB Pressure, EITHER Channel 5 OR 6 must be manually actuated in order to meet the criteria for acceptable performance. This provides reasonable time for the crew to determine that the safety functions are not being met and to implement actions to correct the issue.

CT-1 **Trip all RCPs** (Rule 1.0)

CT based on: Add/Maintain appropriate RCS water mass

TBD Description
Trip all RCPs immediately, no later than 1 or 2 min

TBD Conditions
Anytime adequate SCM is lost

Associated GEOG BASES:

SBLOCA analyses were performed using conservative Appendix K assumptions with the objective of meeting 10CFR50.46 criteria. These analyses predicted that continued RCP operation, during certain SBLOCAs, could lead to RCS void fractions of 70% if RCPs continued to operate longer than [1 or 2] minutes following initiation of the SBLOCA. The analyses predicted that if RCPs were tripped after these high void fractions occurred, the core would not be adequately covered and fuel clad failure would occur.

For more realistic assumptions (e.g., full flow from 2 HPI pumps, 1.0 times decay heat, etc.) the time period to reach these high RCS void fractions was > 10 minutes. However, the GEOG maintained the [1 or 2] minute time period for the following reasons:

- The process of achieving and verifying full HPI flow may take more than [1 or 2] minutes. Also, such a verification requirement represents additional "time constrained diagnosis" operator burden (Reference 3.0). 47-1229003-05
- The use of a 1 or 2 minute and a 10 minute contingency, in the guidance, was considered to increase complexity and the likelihood of confusion.
- The RCP trip on loss of SCM is intended to be an immediate action and to eliminate/reduce time-based decisions (Reference 3.0). Divergence from the concept of immediate to that of measuring time and then acting is expected to detract from this intent.

ANO Version(s)
The RCPs should be tripped within two minutes of a Loss of Adequate Subcooling Margin.
TCOA per OP-1015.050

Justification for ANO
As described in the TBD.
As noted above, this is a Time Critical Operator Action per OP-1015.050.

For the 2016-1 ILO NRC Exam criteria RCPs should be tripped within 2 minutes of LOSM following the reactor trip.

RT-9

MAXIMIZE RB COOLING

1. **Verify all four RB Cooling Fans running:**

- VSF1A
- VSF1C
- VSF1B
- VSF1D

2. **Open RB Cooling Coils Service Water Inlet/Outlet valves:**

- CV-3812/CV-3814
- CV-3813/CV-3815

3. **Unlatch key-locked Chiller Bypass Dampers:**

- SV-7410
- SV-7412
- SV-7411
- SV-7413

END

RT-5

VERIFY PROPER EFW ACTUATION AND CONTROL

1. Verify EFW actuation indicated on C09:

Train A:
- Bus 1
- Bus 2

Train B:
- Bus 1
- Bus 2

NOTE
Table 1 contains EFW fill rate and level bands for various plant conditions.

2. Verify at least one EFW pump (P7A or P7B) running with flow to SG(s) through applicable
EFW CNTRL valve(s).

SG A		**SG B**
CV-2645	**P7A**	CV-2647
CV-2646	**P7B**	CV-2648

3. IF SCM is not adequate,
THEN perform the following:

A. Select Reflux Boiling setpoint for the following:

- Train A
- Train B

NOTE
Table 2 contains examples of less than adequate/excessive EFW flow.

B. Verify EFW CNTRL valves operate to establish and maintain SG levels 370 to 410”.

VERIFY PROPER EFW ACTUATION AND CONTROL

3. (Continued)

1) **IF** both SGs are available,
THEN verify SG level rising and tracking EFIC setpoint until 370 to 410” is established.

a) **IF** EFW flow is less than adequate,
THEN control EFW to applicable SG in HAND to maintain ≥ 340 gpm to applicable SG until level is 370 to 410”.

b) **IF** EFW flow is excessive
AND
> 340 gpm to either SG,
THEN throttle EFW to applicable SG in HAND to limit SG depressurization.
Do **not** throttle below 340 gpm on either SG until SG level is 370 to 410”.

2) **IF** only one SG is available,
THEN feed available SG in HAND at ≥ 570 gpm until SG level is 370 to 410”.

3) **IF** EFW is being controlled in HAND
AND
SG press drops below 720 psig due to EFW flow induced overcooling,
THEN continue feeding at required minimum rate
AND perform the following:

a) Bypass MSLI by momentarily placing SG Bypass toggle switch on each EFIC cabinet Initiate module in BYPASS.

- C37-3
- C37-4
- C37-1
- C37-2

b) Place applicable EFW CNTRL valves in VECTOR OVERRIDE:

SG A		**SG B**
CV-2645	**P7A**	CV-2647
CV-2646	**P7B**	CV-2648

c) Place applicable EFW ISOL valves in MANUAL.

SG A		**SG B**
CV-2627	**P7A**	CV-2620
CV-2670	**P7B**	CV-2626

VERIFY PROPER EFW ACTUATION AND CONTROL

4. **<u>IF</u> SCM is adequate,**
<u>THEN</u> perform the following:

<u>CAUTION</u>
Excessive EFW flow can result in loss of SCM due to RCS shrinkage.

<u>NOTE</u>

- Table 2 contains examples of less than adequate/excessive EFW flow.
- Expect CETs to rise until natural circ conditions are established. If EFW flow control is in HAND, additional flow may not be necessary to prevent rising CETs until natural circ conditions are established.

A. Verify EFW CNTRL valves operate to establish and maintain applicable SG level band per Table 1.

1) **<u>IF</u>** EFW flow is less than adequate
<u>OR</u>
EFW flow is excessive,
<u>THEN</u> control EFW to applicable SG in HAND as necessary to ensure the following:

- Maintain sufficient EFW flow to prevent rise in CET temp.
- Maintain continuous EFW flow until applicable level band is reached.
- Maintain sufficient EFW flow to ensure SG level is either stable **<u>OR</u>** rising until applicable level band is reached.

5. **<u>IF</u> all RCPs are off,**
<u>THEN</u> check primary to secondary heat transfer in progress indicated by all of the following:

- T-cold tracking associated SG T-sat (Fig. 2)
- T-hot tracking CET temps
- T-hot/T-cold ΔT stable or dropping

6. **Monitor EMERGENCY FEEDWATER and EFIC alarms on K12.**

VERIFY PROPER EFW ACTUATION AND CONTROL

Table 1		
EFIC Automatic Level Control Setpoints		
Condition	**Level Band**	**Automatic Fill Rate**
Any RCP running	20 to 40”	No fill rate limit
All RCPs off and Natural Circ selected	300 to 340”	2 to 8”/min
All RCPs off and Reflux Boiling selected	370 to 410”	2 to 8”/min

Table 2
Examples of Less Than Adequate EFW Flow Indications
• SG level < 20” and no EFW flow indicated • All RCPs off and SG level not tracking EFIC calculated setpoint • All RCPs off and EFIC level setpoint not trending toward applicable level band
Examples of Excessive EFW Flow Indications
• SG press drops ≥ 100 psig due to EFW flow induced overcooling • SCM approaching minimum adequate due to EFW flow induced overcooling • EFW CNTRL valve open with associated SG level > applicable setpoint level band

END

CHECK SG TUBE INTEGRITY

1. **Check the following indications:**

- **None of the following radiation monitor indications rising OR in alarm:**
  - **Main Condenser process monitor (RI-3632)**
  - **Either OTSG N-16 Gross Detector:**
    - **RI-2691**
    - **RI-2692**
  - **Either Steam Line High Range Radiation Monitor:**
    - **RI-2681**
    - **RI-2682**
- **No report from Nuclear Chemistry that SG tube leak exists.**
- **No rise in unidentified RCS leakage accompanied by:**
  - **Higher than expected SG level**
  - **Lower than expected FW flow rate**

END

CONTROL RCS PRESS

> **NOTE**
>
> - PTS limits apply if any of the following has occurred:
>   - HPI on with all RCPs off
>   - RCS C/D rate > 100°F/hr with Tcold < 355°F
>   - RCS C/D rate > 50°F/hr with Tcold < 300°F
> - Once invoked, PTS limits apply until an evaluation is performed to allow normal press control.
> - When PTS limits are invoked OR SGTR is in progress, PZR cooldown rate limits do not apply.
> - PZR cooldown rate <100°F/hr.

1. **IF PTS limits apply or RCS leak exists,**
   THEN maintain RCS press low within limits of Figure 3.

2. **IF RCS press is controlled AND will be reduced below 1650 psig,**
   THEN bypass ESAS as RCS press drops below 1700 psig.

3. **IF PZR steam space leak exists,**
   THEN limit RCS press as PZR goes solid by one or more of the following:

   A. Throttle makeup flow.

   B. **IF** SCM is adequate,
      THEN throttle HPI flow by performing the following:

      1) Verify both HPI Recirc Blocks open:

         - CV-1300
         - CV-1301

      2) Throttle HPI.

   C. Raise Letdown flow.

      1) **IF** ESAS has actuated,
         THEN unless fuel damage or RCS to ICW leak is suspected, restore Letdown per RT-13.

   D. Verify Electromatic Relief ERV Isolation open (CV-1000)
      AND cycle Electromatic Relief ERV (PSV-1000).

CONTROL RCS PRESS

4. <u>IF</u> RCS press is high,
<u>THEN</u> limit press using one or more of the following:

A. Throttle makeup flow.

B. Throttle HPI flow by performing the following:

1) Check adequate SCM **<u>AND</u>** any of the following conditions met:

- HPI Cooling (RT-4) **<u>not</u>** in progress
- CET temps dropping
- RCS press rising with Electromatic Relief ERV (PSV-1000) open

2) Verify both HPI Recirc Blocks open:

- CV-1300
- CV-1301

3) Throttle HPI.

C. **<u>IF</u>** RCP is running,
<u>THEN</u> operate Pressurizer Spray Control (CV-1008) in HAND.

D. **<u>IF</u>** PZR AUX Spray is in service,
<u>THEN</u> throttle Pressurizer AUX Spray (CV-1416) open.

E. Place Pressurizer Heaters in OFF.

F. Raise Letdown flow.

1) **<u>IF</u>** ESAS has actuated,
<u>THEN</u> unless fuel damage or RCS to ICW leak is suspected restore Letdown per RT-13.

G. Verify Electromatic Relief ERV Isolation open (CV-1000)
<u>AND</u> cycle Electromatic Relief ERV (PSV-1000).

(4. CONTINUED ON NEXT PAGE)

CONTROL RCS PRESS

4. (Continued)

H. **IF** desired to secure HPI pump(s),
THEN perform the following:

1) Start AUX Lube Oil pumps for associated HPI pump(s):

P36A	**P36B**	**P36C**
P64A	P64B	P64C

2) Stop desired HPI pump(s):

- P36A
- P36B
- P36C

3) Close all associated HPI Block valves:

P36A/B	**P36B/C**
• CV-1219	• CV-1227
• CV-1220	• CV-1228
• CV-1278	• CV-1284
• CV-1279	• CV-1285

5. IF RCS press is low,
THEN raise press using one or more of the following:

A. Raise makeup flow.

B. Raise HPI flow or initiate HPI per RT-2.

C. **IF** RCP is running,
THEN verify Pressurizer Spray Control (CV-1008) closed.

D. Reduce Letdown flow.

E. Place Pressurizer Heaters in MANUAL.

(5. CONTINUED ON NEXT PAGE)

CONTROL RCS PRESS

5. (CONTINUED)

CAUTION
If HPI cooling is in progress, Electromatic Relief ERV Isolation (CV-1000) must be left open until HPI cooling is no longer required.

F. Verify Electromatic Relief ERV (PSV-1000) or Electromatic Relief ERV Isolation (CV-1000) closed.

CAUTION
With RCS solid, 1°F temp change can cause 100 psig press change.

6. IF PZR is solid,
THEN RCS press may also be controlled by varying RCS temperature.

- Raise RCS temp to raise RCS press
- Lower RCS temp to lower RCS press

NOTE
Adjusting Pressurizer Level Control setpoint and HPI as necessary to maintain normal makeup flow on-scale will allow CV-1235 to automatically compensate for small changes in RCS leak rate and cooldown rate.

7. IF normal makeup is in service
AND
HPI is in service,
THEN adjust Pressurizer Level Control setpoint and HPI as necessary to maintain normal makeup flow on-scale.

END

VERIFY PROPER ESAS ACTUATION

NOTE
Obtain Shift Manager/CRS permission prior to overriding ES.

1. Verify BWST T3 Outlets open:

- CV-1407
- CV-1408

A. **IF** BWST T3 Outlet (CV-1407 or CV-1408) fails to open,
THEN override **AND** stop associated HPI, LPI, and RB Spray pumps until failed valve is opened:

CV-1407	CV-1408
P34A	P34B
P36A/B	P36C/B
P35A	P35B

2. Verify SERV WTR to DG1 and DG2 CLRs open:

- CV-3806
- CV-3807

VERIFY PROPER ESAS ACTUATION

**3. <u>IF</u> any RCP is running,
<u>THEN</u> perform the following:**

A. **<u>IF</u>** ES Channel 5 or 6 has actuated,
<u>THEN</u> perform the following:

1) **<u>IF</u>** SCM is adequate,
<u>THEN</u> trip all running RCPs due to loss of ICW:

- P32A
- P32B
- P32C
- P32D

2) **<u>IF</u>** SCM is **<u>not</u>** adequate,
<u>THEN</u> check elapsed time since loss of adequate SCM
<u>AND</u> perform the following:

a) **<u>IF</u>** $\leq$ 2 minutes have elapsed,
<u>THEN</u> trip all RCPs:

- P32A
- P32B
- P32C
- P32D

b) **<u>IF</u>** > 2 minutes have elapsed,
<u>THEN</u> perform the following:

(1) Leave currently running RCPs on.

(2) **<u>IF</u>** RCS press > 150 psig,
<u>THEN</u> notify CRS to **GO TO 1202.002, "LOSS OF SUBCOOLING MARGIN"** procedure.

(3) Restore RCP services per RT-8 while continuing.

B. **<u>IF</u>** neither ES channel 5 nor 6 has actuated,
<u>THEN</u> dispatch an operator to perform Service Water And Auxiliary Cooling System (1104.029) Exhibit B, "Restoring SW to ICW Following ES Actuation" while continuing.

1) **<u>WHEN</u>** ICW Cooler SW Outlets and Bypasses are aligned per 1104.029, Exhibit B,
<u>THEN</u> override **<u>AND</u>** open one Service Water to ICW Coolers Supply (CV-3811 or CV-3820).

VERIFY PROPER ESAS ACTUATION

4. Verify proper ESAS Channels tripped:

Condition	**Channels Actuated**
RCS press ≤ 1550 psig	1,2,3,4
RB press ≥ 18.7 psia	1,2,3,4,5,6
RB press ≥ 44.7 psia	7,8,9,10

5. Perform the following:

A. Verify each component properly actuated on C16 and C18, **except** those overridden in previous steps.

B. Verify proper ES system flow rates.

NOTE

- During ESAS actuation, low LPI flow is expected until RCS depressurizes below LPI pump shutoff head.
- During large break LOCAs, high LPI flow can be experienced. Flow must be throttled to ensure ECCS flows are maintained within assumptions of calculations.

1. **IF** any of the following conditions exist:

    - A HPI FLOW HI/LO (K11-A4)
    - B HPI FLOW HI/LO (K11-A5)
    - A LPI FLOW HI/LO (K11-B4)
    - B LPI FLOW HI/LO (K11-B5)
    - A RB SPRAY FLOW HI (K11-C4)
    - B RB SPRAY FLOW HI (K11-C5)

    THEN use Annunciator K11 Corrective Action (1203.012J) to clear unexpected alarms.

C. **IF** only one train of HPI is available
AND
RCS press is > 600 psig,
THEN throttle HPI Block valve with the highest flow to within 20 gpm of the next highest flow.

VERIFY PROPER ESAS ACTUATION

6. On C10, perform the following:

- Verify DGs operating within normal limits:
  - DG 1
    - 4100 to 4200 V
    - 59.5 to 60.5 Hz
    - ≤ 2750 KW
  - DG 2
    - 4100 to 4200 V
    - 59.5 to 60.5 Hz
    - ≤ 2750 KW
- Verify the following breakers open:
  - A3-A4 Crossties:
    - A-310
    - A-410
  - B5-B6 Crossties:
    - B-513
    - B-613
  - Unit AUX feeds to A1 and A2:
    - A-112
    - A-212
- Verify the following breakers closed:
  - A3 Feeds to B5:
    - A-301
    - B-512
  - A4 Feeds to B6:
    - A-401
    - B-612

7. On C09, perform the following:

A. Check AUX Cooling Water header depressurized.

B. **IF** proper EFW actuation and control has **not** already been verified, **THEN** verify proper EFW actuation and control (RT-5).

VERIFY PROPER ESAS ACTUATION

8. On C19, perform the following:

A. Verify LPI (Decay Heat) Room Cooler running in each Decay Heat Room:

P34A Room	P34B Room
VUC1A or B	VUC1C or D

B. **IF** RB Spray has actuated,
THEN verify SW to RB Spray P35A and P35B LO CLRs open:

- CV-3804
- CV-3805

9. IF all RCPs are off
AND
RCP Seal INJ Block (CV-1206) is closed,
THEN place RCP Seal Bleedoff (Alternate Path to Quench Tank) controls in CLOSE:

- SV-1271
- SV-1270
- SV-1273
- SV-1272

10. IF leakage into the RB is indicated,
THEN verify RB cooling maximized:

A. Verify all four RB Cooling Fans running:

- VSF1A
- VSF1B
- VSF1C
- VSF1D

B. Verify RB Cooling Coils Service Water Inlet/Outlet valves open:

- CV-3812/CV-3814
- CV-3813/CV-3815

C. Verify key-locked Chiller Bypass Dampers unlatched:

- SV-7410
- SV-7411
- SV-7412
- SV-7413

VERIFY PROPER ESAS ACTUATION

11. Initiate RB H_2 sampling using Containment Hydrogen Control (1104.031), Exhibit A.

12. Verify each component properly actuated on C26.

13. Verify the following sample valves closed on C26:

- Pressurizer Steam Space Sample Valve (CV-1814)
- Pressurizer Water Space Sample Valve (CV-1816)
- Hot Leg Sample (SV-1840)

14. Verify the following High Point Vents closed:

A Loop	B Loop	Reactor Vessel	Pressurizer
• SV-1081	• SV-1091	• SV-1071	
• SV-1082	• SV-1092	• SV-1072	• SV-1077
• SV-1083	• SV-1093	• SV-1073	• SV-1079
• SV-1084	• SV-1094	• SV-1074	

15. IF AUX Lube Oil pump for running HPI pump fails to stop after 20 second time delay, THEN within one hour of ESAS actuation dispatch an operator to stop AUX Lube Oil pump locally at breaker while continuing:

P64A	P64B	P64C
B5721	B5722/B6515	B6514

16. Place running Low Pressure Injection (Decay Heat) Pump (P34A/P34B) hand switches in NORMAL-AFTER-START to enable DECAY HEAT PUMP TRIP (K09-A7) alarm:

- P34A
- P34B

17. Monitor ENGINEERED SAFEGUARDS ACTUATION SYSTEM alarms on K11.

VERIFY PROPER ESAS ACTUATION

18. IF any of the following components/systems are in service:

- **Condensate Pumps**
- **Condenser Vacuum Pumps**
- **Waterbox Vacuum Pumps**
- **Seal Oil System**
- **Control Room Chillers**

THEN coordinate with CRS/SM to secure components and/or systems, as time permits.

19. Coordinate with CRS/SM to re-verify component actuation with another operator.

END

Facility: **ANO-1** Scenario No.: **4** Op-Test No.: **2016-1**

Examiners: ______________________ Operators: ______________________

Initial Conditions: **99.7% power, P-7B EFW Pump OOS**

Turnover: **99.7% power, P-7B EFW Pump OOS, Group 7 rods at 95%**

Event No.	Position	Event Type*	Event Description
1	ATC	R	Dilute rods in 2%
2	BOP CRS	C TS	CFT Pressure high
3	ATC BOP	I	"B" Steam Generator S/U Level Fails Low.
4	ATC	C	P-8A Trips requiring down power to 70%
5	BOP	I	Turbine stops responding to down power at 90%
6	All	C TS	RCP Seal Cooler leak
7	All	M	Condensate system leak results in a loss of all MFW and Reactor trip
8	ATC	I CT	Failure of EFIC to actuate
9	BOP	C CT	P-7A Trip resulting in transition to Overheating EOP

*(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS) Technical Specification, (CT) Critical Task

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Malfunctions after EOP entry (1-2)	2
2. Abnormal events (2-4)	4
3. Major transients (1–2)	1
4. EOPs entered/requiring substantive actions (1–2)	1
5. EOP contingencies requiring substantive actions (0-2)	1
6. EOP based Critical tasks (2–3)	2

<u>NARRATIVE:</u>

This scenario begins with plant power at 99.7% and Group 7 rods at 95%. During turnover the crew is directed to dilute and insert rods 2% (Approximately 4 ppm dilution). ICS will automatically insert rods to maintain RCS Tave at setpoint. The dilution will require a calculation performed on the plant computer and operation of the BATCH Controller to add the DI Water to the Makeup Tank.

After the dilution is started, the B CFT (Core Flood Tank) pressure will rise above the T.S. limit which will require entry into T.S. 3.5.1 Condition B. The BOP will be directed to vent the tank pressure off. The field operators will be dispatched to verify the flowpath of nitrogen to the CFT is isolated. Report from the field will reveal that the lineup was not properly secured by the previous crew.

After venting the CFT, the “B” Steam Generator S/U Level will fail low. The ATC will have to identify the failure, he will then place the “B” MFW Pump H/A Station to HAND in accordance with the ICS AOP (Abnormal Operating Procedure), the BOP will verify the other channel reading properly by performing a channel check on the plant computer and then the BOP will select the NNI-Y channel. When the good signal is selected the ATC will return the ICS station to automatic control.

After the MFW Pump control is back in automatic, a Heater Drain Pump (P-8A) will trip which requires a rapid downpower to 70% (10%/min) in accordance with the Rapid Plant Shutdown AOP. During the downpower the Main Turbine will stop responding which will require manual action by the BOP to balance the plant and continue with the downpower.

After the downpower to 70% is complete, an RCP Seal Cooler leak will develop requiring entry into T.S. 3.4.13 for RCS Leakage and performance of Excess RCS Leakage AOP. This will result in taking the unit off line.

The major event will begin, during the final downpower, with a large Condensate System leak. A report from the field will let the crew know that it is an unrecoverable leak and will result in the loss of all Main Feedwater Pumps including the Auxiliary Feedwater Pump (P-75).

A loss of all Feedwater should cause an EFIC actuation however, EFIC will fail to actuate EFW requiring the ATC to complete the actuation (critical task). This will result in P-7A being the only source of feed since P-7B was out of service as indicated in the initial conditions. The controlling procedure at this time is the Reactor Trip EOP. (PRA)

The final event is a trip of the steam driven EFW pump P-7A. The CRS will transition to the Overheating EOP which will require a critical action of the BOP to initiate HPI Cooling. Once control is established with HPI Cooling in progress the scenario is complete. (PRA)

<u>PRA / IPE explanation:</u>

Key equipment for potential risk increase includes Feedwater Control System, Emergency Feedwater System, and Makeup and Purification.

Key Operator actions include initiating HPI Cooling.
Initiating events include a Loss of Feedwater.

<u>Critical Tasks</u>

CT-10 - Establish FW Flow and Feed SG(s), acceptable performance is to initiate EFW prior to the Steam Generator going dry as indicated by a steady level of 6 inches on EFIC Low Range.

CT-14 – Initiate HPI Cooling, acceptable performance is to initiate HPI Cooling within 20 minutes of the loss of all Feedwater and Emergency Feedwater. This time begins when P-7A trips.

Op-Test No.: **2016** Scenario No.: **4** Event No.: **1**

Event Description: **Crew will dilute rods in 2% per OP-1103.004 Section 12 "Dilution – Manual Batch Feed"**

Time	Position	Applicant's Actions or Behavior
		Reference OP-1103.004
		CAUTION The following section has been determined to have a Reactivity Addition Potential (RAP). This activity is classified as a Risk Level R2 if dilution >3 ppm is planned or Risk Level R3 if dilution <u><</u>3 ppm is planned.
	N/A brief conducted prior to taking the watch	12.1.1 <u>IF</u> a Reactivity Management Brief has <u>NOT</u> been conducted, <u>THEN</u> perform a Reactivity Management Brief per COPD-030 with an SRO.
		NOTE Since Letdown 3-Way Valve (CV-1248) allows all three of its flowpaths to be open to each other momentarily during stroke, some flow from Batch Controller Outlet (CV-1250) can go directly to the bleed flowpath, reducing expected reactivity effects. Rods will not move in as far as expected when diluting with high boron concentrations early in core life, up to ~0.6% less inward motion can occur.
	ATC	12.1.2 Dilution is required for boron concentration change during normal operation to maintain required control rod configuration.
	ATC	12.1.3 Makeup and purification system in operation per Makeup & Purification System Operation (1104.002), "System Startup" section.
	ATC	12.1.4 Chemical addition system aligned per Conduct of Operations (1015.001), "System Alignment Verification" section.

Op-Test No.: **2016**	Scenario No.: **4**	Event No.: **1**

Event Description: **Crew will dilute rods in 2% per OP-1103.004 Section 12 "Dilution – Manual Batch Feed"**

Time	Position	Applicant's Actions or Behavior
	ATC	12.1.5 IF manual bleed is to be initiated, THEN verify the following: • Vacuum degasifier either bypassed or in-service per Vacuum Degasifier Operations (1104.016). • Clean liquid waste system in operation per Clean Waste System Operation (1104.020), "Initial Startup" section.
		NOTE • When using the BORON program, any operating conditions may be input. • "Mass of Reactor Coolant vs. Pressurizer Level", Attachment C and the BORON program automatically add 167,000 pounds to the reactor coolant mass when RCS temperature is ≤ 250.0°F, to account for the decay heat system.
	BOP / ATC	12.1.7 Perform the following calculations: A. Use "Feed Volume for Batch Boration or Dilution", Attachment A.3 OR Plant Monitoring System BORON program to determine volume of DI water needed. B. Record volume of batch to be added on "RCS Liquid Addition Data Sheet", Attachment B. C. Obtain an RO/SRO independent review of calculation and record on "RCS Liquid Addition Data Sheet", Attachment B.

Op-Test No.: **2016** Scenario No.: **4** Event No.: **1**

Event Description: **Crew will dilute rods in 2% per OP-1103.004 Section 12 "Dilution – Manual Batch Feed"**

Time	Position	Applicant's Actions or Behavior
	ATC	12.1.8 Ensure adequate storage availability exists for any waste to be generated, if applicable. • Compare volume of feed calculated in above step vs. available Clean Waste Receiver Tanks (T-12s) and any excess letdown due to heatup if applicable. • IF Clean Waste Receiver Tanks (T-12s) cannot receive required volume, THEN transfer applicable Clean Waste Receiver Tanks (T-12s) to Unit 2 per Clean Waste System Operation (1104.020).
	ATC	12.1.9 IF dilution >3 ppm is planned, THEN verify reactor power ≤99.75%.
		CAUTION Proper batching of DI water to the Makeup Tank (T-4) during high Condensate Transfer System usage can require two Condensate Transfer Pumps (P-9A, P-9B) in-service to provide adequate pressure. (CR-ANO-1-2012-1045)
	BOP	12.1.10 Verify at least one Condensate Transfer Pump (P-9A, P-9B) in-service.
BOOTH: Report that P-9A is in service		
	ATC	12.1.11 IF desired, THEN GO TO "Batch Controller Operation" Attachment H of this procedure and exit this section.
EXAMINER NOTE: Operation of the BATCH Controller can be performed from the step by step procedure or by following Attachment H which is a checklist of actions that can be utilized by an operator with experience setting up the BATCH Controller either way is acceptable in this case. The initial condition of Attachment H are a repeat of the previous steps and are not duplicated below		
	ATC / BOP	2.1 Verify Batch Controller set up for required batch size and flowrate. 2.1.1 Obtain Licensed Operator verification of required batch size.

Op-Test No.: **2016** Scenario No.: **4** Event No.: **1**

Event Description: **Crew will dilute rods in 2% per OP-1103.004 Section 12 "Dilution – Manual Batch Feed"**

Time	Position	Applicant's Actions or Behavior
	ATC	2.2 Verify both Makeup Filters in-service: • Makeup Filter (F-3A) • Makeup Filter (F-3B)
	ATC	2.3 IF dilution with Manual Batch Feed, THEN perform the following: 2.3.1 Open Condensate to Batch Controller (CV-1251). 2.3.2 Open Batch Controller Outlet (CV-1250). 2.3.3 Start Batch Controller by depressing RUN. 2.3.4 IF desired to reduce inventory, THEN place Letdown 3-way valve (CV-1248) in BLEED. A. WHEN no longer desired to BLEED, THEN verify Letdown 3-way valve (CV-1248) in LETDOWN. 2.3.5 IF desired, THEN adjust Batch Controller Flow Control Valve (CV-1249) to regulate flow. 2.3.6 WHEN batch completes OR must be stopped, THEN verify the following valves closed: • Batch Controller Outlet (CV-1250) • Batch Controller Flow Control Valve (CV-1249) 2.3.7 Close Condensate to Batch Controller (CV-1251).

Op-Test No.: **2016**	Scenario No.: **4**	Event No.: **1**

Event Description: **Crew will dilute rods in 2% per OP-1103.004 Section 12 "Dilution – Manual Batch Feed"**

Time	Position	Applicant's Actions or Behavior
		2.3.8 IF desired, THEN perform one of the following to remove extra Makeup Filter (F-3A/B) from service: • Place Makeup Filter F-3A handswitch (HS-1246) to CLOSE. • Place Makeup Filter F-3B handswitch (HS-1247) to CLOSE. 2.3.9 Update "RCS Liquid Addition Data Sheet", Attachment B as appropriate. 2.3.10 IF reactor power was reduced ≤99.75%, AND dilution reactivity effects have occurred, THEN may raise power as desired.
	ATC	Monitor for expected reactivity effects of the dilution
Advance to next event at lead evaluator discretion		

Op-Test No.: **2016**	Scenario No.: **4**	Event No.: **2**
Event Description: **"B" Core Flood Tank Pressure high resulting in a T.S. entry**		

Time	Position	Applicant's Actions or Behavior
		Reference ACA OP-1203.012I for K10-B5 for CFT B PRESS HI/LO
	BOP	1. Determine whether CFT (T-2B) pressure is high or low from Core Flood Tank "B" (PI-2419, PI-2418) Press on C16 and C18.
		NOTE TS 3.5.1 band for Core Flood Tank pressure is 600 ± 40 psig (560 to 640 psig). Instrument uncertainties require maintaining CFT pressure within a narrower band.
	CRS	2. IF pressure is outside of band 572 to 628 psig, THEN declare CFT inoperable, write a Condition Report and enter TS 3.5.1 Condition B.
Booth: Once the CFT pressure exceeds 630 psig, set Remote for N2-5 back to 0. This will stop the pressurization and allow for lowering pressure back to within band.		
	BOP	3. IF pressure is high, THEN lower pressure using Core Flood System Operating Procedure (1104.001), "Venting and Depressurizing Core Flood Tanks (CFTs)" section. A. Do NOT allow pressure to exceed band of 572 to 628 psig.
	BOP	Reference OP-1104.001, Venting and Depressurizing Core Flood Tanks (CFT) section
		CAUTION • Vented gas can be radioactive. • When RCS is >800 psig, CFT admin limits for pressure 580-620 psig must be observed to avoid violating limits of TS 3.5.1.
Booth: When dispatched report back that N2-5 was found partially open and N2-2 was found with N2 aligned.		
		NOTE If depressurizing for refueling shutdown and performance of Supplements 2 and 3 of this procedure is required, CFT pressure of 60 to 70 psig will be needed.
	BOP	14.2 IF lowering CFT T-2B pressure, THEN open Core Flood Tank T2B Vent (CV-2420) handswitch HS-2420. 14.2.1 WHEN desired pressure is reached, THEN close CV-2420 handswitch HS-2420.
Advance to next event at lead evaluator discretion		

Op-Test No.: **2016** Scenario No.: **4** Event No.: **3**
Event Description: **B SG S/U Level fails low slowly, requiring taking the B MFW Pump to HAND and selecting the good (NNI-Y) signal for control before returning the MFW Pump to automatic.**

Time	Position	Applicant's Actions or Behavior
	CRS	Reference OP-1203.001, ICS Abnormal Operations
	ATC	**1. Place affected MFW Pump H/A to HAND.**
	N/A	**2. IF Main Feedwater Block Valve(s) closed, THEN place associated Startup and Low Load Control Valves in HAND.**
		NOTE Placing both Feedwater Loop Demand H/As in HAND will result in an ICS tracking condition which will ensure ICS follows generated megawatts potentially allowing for more stable transient recovery.
	ATC	**3. IF desired, THEN place the following in HAND:** • Feedwater Loop A Demand H/A • Feedwater Loop B Demand H/A
	ATC	**4. Perform the following to stabilize RCS parameters:** • **IF** Main Feedwater Block Valve(s) closed, **THEN** operate associated Startup and Low Load Control Valves in HAND. • Lower affected MFW Pump H/A as necessary
	BOP	**6. Select the good SG Startup Level instrument for indication.** • STM GEN B: – LT-2613 – **LT-2614 (NNI-Y)**

Op-Test No.: **2016** Scenario No.: **4** Event No.: **3**

Event Description: **B SG S/U Level fails low slowly, requiring taking the B MFW Pump to HAND and selecting the good (NNI-Y) signal for control before returning the MFW Pump to automatic.**

Time	Position	Applicant's Actions or Behavior
	ATC	**7. Proceed as directed by CRS/SM.**
	CRS	Direct returning MFW Pump to Automatic per OP-1105.004
		18.0 Main Feedwater Pump Transfer to Auto
	N/A	**CAUTION** • If reactor power ~20%, then placing MFW Pump H/A stations in AUTO could result in erratic feedwater control. • With both MFW Pumps in manual and the Feedwater Pumps Disch Crosstie (CV-2827) open, placing "B" MFW Pump in AUTO with a significant difference in demand signals between "A" and "B" MFW Pumps will cause a feedwater transient.
		NOTE POS reads MFW pump speed demand(3000-5900 RPM). If Main FW Block Valve is closed, then MEAS VAR reads valve ΔP (0-100 PSI). If Main FW Block Valve is open, then MEAS VAR reads flow error (50% = null).
EXAMINER NOTE: The guidance below assumes that the failure was noticed and the B MFW Pump was taken to hand prior to any changes in FW flow. If the crew was slow and actual FW flow changes occurred, then additional stations would have been taken to manual prior to restoring the MFW Pump to automatic.		
	N/A	18.1 IF in ΔP control (Main FW Block Valve closed), … N/A

Op-Test No.: **2016** Scenario No.: **4** Event No.: **3**

Event Description: **B SG S/U Level fails low slowly, requiring taking the B MFW Pump to HAND and selecting the good (NNI-Y) signal for control before returning the MFW Pump to automatic.**

Time	Position	Applicant's Actions or Behavior
	ATC	18.2 IF in flow control (Main FW Block Valve open), THEN transfer as follows: 18.2.1 Null flow error by performing either or both of the following: • Adjust associated Feedwater Demand H/A in HAND. • Slowly adjust pump speed/auto demand using MFW Pump H/A station to null flow error. 18.2.2 Place MFW Pump H/A station in AUTO.
EXAMINER NOTE: The following steps are provided in the event that the crew has to take additional ICS stations to hand to respond to the previous event. These steps provide direction for Transferring Major ICS Control Stations to AUTO.		
		8.1 Initial conditions: • Diamond Panel in Manual, if applicable • RX Demand in HAND • Feedwater Demand Loop A in HAND • Feedwater Demand Loop B in HAND • Load Ratio ΔT-cold in HAND • ULD Unit Master Station in HAND • Reactivity Management Brief performed per COPD-030 with an SRO

Op-Test No.: **2016** Scenario No.: **4** Event No.: **3**

Event Description: **B SG S/U Level fails low slowly, requiring taking the B MFW Pump to HAND and selecting the good (NNI-Y) signal for control before returning the MFW Pump to automatic.**

Time	Position	Applicant's Actions or Behavior
		NOTE • With the major stations in HAND, and the plant in a stable (balanced) condition, aligning all stations prior to returning any station to AUTO will provide a controlled, bumpless return to full automatic. • Description section 3.1 of this procedure contains "Expected and normal indications when transferring H/A stations to manual".
		8.2 IF MEAS VAR can NOT be aligned, THEN GO TO the appropriate section for transferring station with misaligned MEAS VAR to AUTO.
		8.3 IF SG/RX Demand in AUTO, THEN perform the following: 8.3.1 Verify SG/RX Demand station display selected to POS. 8.3.2 Depress SG/RX Demand station HAND pushbutton. 8.3.3 Check SG/RX Demand station output remains steady.
		8.4 Verify Turbine in INTEG CONTROL, controlling Turbine Header pressure at setpoint.
		CAUTION To ensure bumpless transfer, a transfer of H/A station from HAND to AUTO is not made without first minimizing error between: • MEAS VAR and POS on controller for H/A stations other than ULD • Current power and PMS CTP input for ULD

Op-Test No.: **2016** Scenario No.: **4** Event No.: **3**

Event Description: **B SG S/U Level fails low slowly, requiring taking the B MFW Pump to HAND and selecting the good (NNI-Y) signal for control before returning the MFW Pump to automatic.**

Time	Position	Applicant's Actions or Behavior
		8.5 Check MEAS VAR on both FW Loop Demand stations on the caret. 8.5.1 IF required, THEN drive SG/RX Demand in HAND until either limit below is met: • MEAS VARs for Feedwater Demand Loop A and Feedwater Demand Loop B are at the caret. • Indicated error is split between the two MEAS VARs. 8.5.2 IF error between the two loops differs, THEN drive Load Ratio ΔT-cold H/A station in HAND to remove difference.
		8.6 Check T-ave is at setpoint. 8.6.1 IF required, THEN perform one or both of the following: • Move rods in MANUAL. • Adjust feedwater flow to bring T-ave to setpoint. A. Return to step 8.5.
		8.7 Check RX Demand MEAS VAR on the caret.
		8.8 Check SG/RX H/A station POS and MEAS VAR are approximately equal.
		8.9 Place stations in AUTO as follows: 8.9.1 Diamond Panel, if applicable 8.9.2 RX Demand

Op-Test No.: **2016** Scenario No.: **4** Event No.: **3**

Event Description: **B SG S/U Level fails low slowly, requiring taking the B MFW Pump to HAND and selecting the good (NNI-Y) signal for control before returning the MFW Pump to automatic.**

Time	Position	Applicant's Actions or Behavior
		8.9.3 Feedwater Loop Demands: • Loop A FW Loop Demand • Loop B FW Loop Demand 8.9.4 Load Ratio ΔT-cold 8.9.5 SG/RX Demand
		8.10 Check UNIT MASTER IN TRACK (K07-A1) alarm clear.
Advance to next event at lead evaluator discretion		

Op-Test No.: **2016** Scenario No.: **4** Event No.: **4**		
Event Description: **P-8A Heater Drain Pump trips requiring a down power to 70% at a rate of 10%/min.**		

Time	Position	Applicant's Actions or Behavior
	CRS	Reference ACA OP-1203.012E for K06-A8, P8A/P8B FLOW LO
	ATC	1. Monitor MFWP suction pressure and feedwater flow very closely for adverse effect on feedwater flow.
	      BOP ATC	2. IF either heater drain pump tripped, THEN perform the following: OTHERWISE GO TO step 3 for P-8A low flow with pump running OR GO TO step 4 for P-8B low flow with pump running. A. Verify standby Condensate Pump (one of P-2A thru P-2C) has auto started. B. Commence reducing power at rate up to 10%/minute to within the capacity of T-40 high level dump (~ 630 MW or ~70% power).
		NOTE Heater Drain Pump trip at power levels above 70% requires prompt action to open the Htr Drn Tk Hi Lvl Dump Control Valve Bypass Valve for the affected Heater Drain Pump in order to maintain Heater Drain Tank level on scale.
	BOP N/A BOP N/A	C. IF Heater Drain Pump P-8A tripped, THEN inform Auxiliary Operator Heater Drain Pump P-8A tripped AND to perform "Local Actions for Heater Drain Tank T-40A Level Control On High Level Dump" Exhibit A of this procedure. (Exhibit A is located at T-40 level instrument rack R43.) D. IF Heater Drain Pump P-8B tripped, … N/A E. Place Low Level Condenser Spray CV-2907 AND CV-2868 into service by placing HS-2907 on C02 in OPEN. F. IF necessary, … N/A

Op-Test No.: **2016** Scenario No.: **4** Event No.: **4**		
Event Description: **P-8A Heater Drain Pump trips requiring a down power to 70% at a rate of 10%/min.**		

Time	Position	Applicant's Actions or Behavior
	BOP	G. Verify the following Polisher parameters are maintained per Condensate Demineralizer System Operation and Regeneration (1106.024): • Polisher ΔP (63 psid max) • Polisher flow (1500 to 3550 gpm) • Polisher Resin Trap ΔP (10 psid)
BOOTH: When dispatched acknowledge that T-40A level will be maintained per local exhibit.		
	BOP	H. WHEN practicable, THEN perform the following: 1) Refer to "Heater Drain Pump (P-8A and P-8B) Shutdown" section of Condensate, Feedwater, and Steam System Operation (1106.016) to place the tripped Heater Drain Pump in a shutdown lineup. 2) Refer to "Power Escalation" section of Power Operation (1102.004) for guidance on operation with one Heater Drain Pump in-service. I. Refer to "Reclosing Tripped Individual Load Supply Breakers" section of Electrical System Operations (1107.001).
EXAMINER NOTE: Once a controlled down power has been established **AND** before the down power is complete, initiate failure on the Main Turbine.		
BOOTH: Insert malfunction when power is reduced to 90% or at the lead evaluators direction.		
Advance to next event at lead evaluator discretion OR at 90% Power.		

Op-Test No.: **2016** Scenario No.: **4** Event No.: **5**

Event Description: **Turbine EHC stops responding during down power.**

Time	Position	Applicant's Actions or Behavior
	CRS	Reference ACA 1203.012F for K07-A1 for UNIT MASTER IN TRACK.
	ATC/BOP	1. Determine cause of tracking.
	BOP	2. IF Unit Master in track is a result an ICS failure OR an ICS input signal failure, THEN take manual control of affected ICS station(s) AND return plant to steady-state condition. A. Refer to ICS Abnormal Operation (1203.001).
	BOP	3. IF caused by EHC in manual, THEN perform the following: A. Verify that NSSS stabilizes. B. Operate EHC system OR ICS in manual until problem has been corrected.
EXAMINER NOTE: The rest of the procedure is N/A. In fact the crew may not reference the ACA since the only action to take is to operate the Turbine in manual to stabilize the plant. The crew may choose to also take the SG/RX station to HAND. IF so, the ATC will control the rate of the down power and the BOP will maintain header pressure within the given band. The following step assumes the turbine is in Operator Auto at a selected rate of change and is leading the down power. **INFORMATION:** There are three modes of operation on the Main Turbine. ICS Auto which is the normal automatic control for the turbine. Operator Auto which requires the BOP to manually change the SETTER and then select GO after which the turbine REFERENCE will change at the rate selected to the SETTER value. Turbine Manual which gives the BOP direct control of the Throttle Valves.		
	ATC / BOP	Continue down power with the Turbine in manual control (Operator Auto) to <70% power. (630 MWe) (Reference Voltage ~74V)
EXAMINER NOTE: Once power is reduced to <70% the next event can be initiated. This will conclude both of the previous two malfunctions.		
Advance to next event at lead evaluator discretion		

Op-Test No.: **2016**	Scenario No.: **4**	Event No.: **6**
Event Description: **RCP Seal Cooler Leak develops at a rate greater than T.S. limit**		

Time	Position	Applicant's Actions or Behavior
		RCP Seal Cooler Leak
	CRS	Reference ACA OP-1203.012G for K08-C7 for RCP BLEEDOFF TEMP HI
	BOP	1. At C13, check bleedoff temperature from each RCP on RCP P-32A thru D Seals recorders, to determine which pump is in alarm.
	CRS	2. IF RCP SEAL COOLING FLOW LO (K08-E7) is alarmed, THEN GO TO K08-E7.
	CRS	3. Refer to "Seal Degradation" section of Reactor Coolant Pump and Motor Emergencies (1203.031).
	CREW	4. Determine cause of problem.
	CRS	Reference OP-1203.031, Seal Degradation Section
	BOP	**1. Verify the following valves are open:** • RCP Seal Bleed off (Normal) Return (CV-1274) • RCP Seal Bleed off (Normal) from P-32D (CV-1270) • RCP Seal Bleed off (Normal) from P-32C (CV-1271) • RCP Seal Bleed off (Normal) from P-32B (CV-1272) • RCP Seal Bleed off (Normal) from P-32A (CV-1273) A. **IF** RCP seal bleed off was inadvertently isolated on a running RCP, **THEN** immediately restore seal bleed off. 1) Verify seal parameters return to normal.
		CAUTION Loss of seal injection to an idle RCP will result in RCP seal bleed off temperature >180°F within a few minutes.

Op-Test No.: **2016**	Scenario No.: **4**	Event No.: **6**
Event Description: **RCP Seal Cooler Leak develops at a rate greater than T.S. limit**		

Time	Position	Applicant's Actions or Behavior
	ATC	**2. Verify RCP Seal INJ Block (CV-1206) open.** A. Verify RC Pump Seals Total INJ Flow (CV-1207) maintaining 32 to 40 gpm. B. Verify individual seal injection flow rates 8 to 10 gpm. C. **IF** one RCP seal injection flow is abnormally high (RCS leak into seal cooler is indicated), **THEN** GO TO Excess RCS Leakage (1203.039). D. **IF** seal injection is lost to an idle RCP, **THEN** seal bleed off should be isolated by performing Exhibit A of this procedure.
	CRS	Reference OP-1203.039
EXAMINER NOTE: Crew may proceed directly to OP-1203.039 when they have identified the RCP Seal Cooler leak based on Seal Injection flowrates.		
	N/A	**1. IF HPI is required to maintain RCS inventory, … N/A**
	N/A	**2. IF desired, … N/A**
	ATC	**3. IF desired, THEN perform one of the following:** • Reduce letdown flow by closing Orifice Bypass (CV-1223) • Isolate Letdown by closing either: – Letdown Coolers Outlet (RCS) (CV-1221) **OR** – Letdown Coolers Outlets (RCS): ♦ CV-1214 ♦ CV-1216
	CRS	**4. IF location of leak is known, THEN perform the applicable step(s):** • RCS Leakage into ICW System step 6 through 9

Op-Test No.: **2016**	Scenario No.: **4**	Event No.: **6**
Event Description: **RCP Seal Cooler Leak develops at a rate greater than T.S. limit**		

Time	Position	Applicant's Actions or Behavior
	CREW	**6. Check any of the following for indications of RCS leakage into ICW system:** • Nuclear Loop ICW activity rising • Indication of Letdown Cooler RCS leak into ICW: – Letdown Cooler ICW Outlet temp rising on PMS: ♦ 8P ICW trend ♦ T2214 for E29A ♦ T2215 for E29B • Indication of RCP Seal Cooler RCS leak into ICW: – RCP Seal Temp rising – RCP Seal Bleedoff Temp rising – Skewed RCP Seal Injection Flows
		NOTE ICW Surge Tank T-37B Level (PDIS 2229) 0.5 to 2.7 psid (1 psid = 333 gallons)
	CRS / BOP	A. Dispatch an operator to determine Nuclear Loop ICW Surge Tank (T37B) level trend.
BOOTH: When dispatched report T-37B rate of change ~0.1 psid/min		
		CAUTION There are indications that a small RCS to ICW leak exists in one or both Letdown Coolers (reference CR-ANO-1-2015-3017). Industry experience has shown that there is elevated risk of more leakage during single cooler operation due to flow-induced vibration.
		NOTE With small leak rates, sufficient time should be available to isolate one cooler at a time.
	N/A	**7. IF RCS leak into Letdown Cooler is indicated, … N/A**
	CRS	**8. IF RCP Seal Cooler RCS to ICW leak is indicated OR RCS leak into Letdown Cooler can not be isolated, THEN perform the following:**

Op-Test No.: **2016** Scenario No.: **4** Event No.: **6**

Event Description: **RCP Seal Cooler Leak develops at a rate greater than T.S. limit**

Time	Position	Applicant's Actions or Behavior
		NOTE Minimum seal injection flow for each RCP is 2.5 gpm.
	ATC N/A ATC BOP	A. **IF** seal injection is available, **THEN** verify ≥ 2.5 gpm seal injection flow per RCP. B. **IF** seal injection is **not** available, … N/A C. Place RCP Seal Cooling pumps in PULL-TO-LOCK: • P-114A • P-114B D. Verify Letdown isolated.
		NOTE After ICW to and from the RB is isolated, RCS leakage into the RCP Seal Cooler will be relieved through the RCP Seal Cooler relief valve and will eventually reach the RB Sump.
	BOP BOP	E. Close Nuclear ICW RB Inlet (CV-2233). F. Close both Nuclear ICW RB Outlets: • CV-2214 • CV-2215
		NOTE If RCS leakage into the RCP Seal is greater than the seal injection flowrate then it is expected that RCP seals will heat up rapidly on the affected Reactor Coolant Pump.
	BOP	G. Monitor RCP Seal temperatures to ensure adequate cooling from seal injection. 1) **IF** required for adequate RCP seal cooling, **THEN** perform the following: a) Verify RC Pump Seals Total INJ Flow (CV-1207) in HAND. b) Raise seal injection flow.

Op-Test No.: **2016** Scenario No.: **4** Event No.: **6**

Event Description: **RCP Seal Cooler Leak develops at a rate greater than T.S. limit**

Time	Position	Applicant's Actions or Behavior
	CRS	H. Notify Radiation Protection to implement Unit 1 Off-Normal Operations (1601.307) for primary to ICW leak.
	CRS	I. Close ICW Surge Tank Crossconnect Isol (ICW-165).
	N/A	J. **IF** RCP Seal temperatures rise, … N/A
	N/A	K. **IF** Nuc ICW Feed and Bleed in progress, … N/A
	CRS	L. **GO TO step 15**.
EXAMINER NOTE: Step 9 is only applicable if RCP Seal temperatures rise indicating inadequate seal cooling otherwise the CRS will proceed to Step 15		
	BOP	**9. IF RCP seals temperatures rise indicating inadequate seal cooling due to RCS leakage greater than seal injection flow, THEN perform the following:**
		NOTE • Flux/ΔFlux/Flow 2 pump reactor trip setpoint is ≥ 52%. With high imbalance, e.g. ±20%, refer to COLR Figure 8-C. • High power/pumps reactor trip setpoints are: – One pump per loop ≥ 55% – Zero pumps in one loop ≥ 0% • Tripping 1 RCP with reactor power > 92% could result in reactor trip on high power/imbalance/flow.
	N/A	A. **IF** tripping the affected RCP(s) will result in automatic reactor trip, … N/A
	BOP	B. **IF** tripping the affected RCP(s) will **not** cause an automatic reactor trip, **THEN** perform the following: 1) Trip affected RCP(s). 2) Verify proper ICS response. 3) **IF** only one RCP is in operation per loop, **THEN** refer to Tech Spec 3.4.4.

Op-Test No.: **2016** Scenario No.: **4** Event No.: **6**		
Event Description: **RCP Seal Cooler Leak develops at a rate greater than T.S. limit**		

Time	Position	Applicant's Actions or Behavior
		NOTE Reverse rotation is indicated by the following: • Computer alarm based on reverse lube oil flow • RCP high vibration • RCP motor bearing high temperature
	BOP	C. **IF** RCP was stopped, **THEN** monitor affected RCP for reverse rotation using any of the following: • Associated RCS loop flow indicates lower than expected • Plant computer reverse rotation alarm on idle RCP (not applicable for P-32B) – RCP P32-A REVERSE ROTATION (FS6510) – RCP P32-C REVERSE ROTATION (FS6512) – RCP P32-D REVERSE ROTATION (FS6513) • Loss of zero speed indication on idle RCP (Indicated by portable instrumentation) D. **IF** RCP reverse rotation is indicated, … N/A
		CAUTION Closing the seal bleed off path on a running RCP will cause seal damage due to overheating.
		NOTE Closing the seal bleed off valves after the RCP is tripped limits the heatup rate of the seal.
	BOP	E. For any RCP tripped due to inadequate seal cooling, perform "RCP Seal Bleedoff Isolation", Exhibit A of Reactor Coolant Pump and Motor Emergency (1203.031) for applicable RCP.
	N/A	**10. Check RCP seals for proper staging.** A. **IF** seal degradation, … N/A

Op-Test No.: **2016** Scenario No.: **4** Event No.: **6**

Event Description: **RCP Seal Cooler Leak develops at a rate greater than T.S. limit**

Time	Position	Applicant's Actions or Behavior
		NOTE Recommended shutdown rates for RCS leaks inside containment with no additional complications are as follows: • < 50 gpm -- 0.5 to 5% per minute • ≥ 50 gpm -- 5 to 10% per minute
	CRS ATC	**16. IF total RCS leakage is in excess of that allowed by Tech Spec 3.4.13 AND poses an immediate threat to plant operations, THEN perform the following:** A. IF reactor is Critical, THEN commence plant shutdown per Rapid Plant Shutdown (1203.045). B. IF reactor is shutdown, … N/A
EXAMINER NOTE: Once T.S. 3.4.13 Condition A is entered all intended aspects of this event are complete.		
	N/A	**17. IF total RCS leakage is in excess of that allowed by Tech Spec 3.4.13 AND poses no immediate threat to plant operations,** … N/A
		NOTE • Non-isolable RCS to ICW leaks should be considered pressure boundary leakage. • After ICW to and from the RB is isolated, RCS leakage into the RCP Seal Cooler will be relieved through the RCP Seal Cooler relief valve and will eventually reach the RB Sump.
	CRS	**18. Advise Shift Manager to implement Emergency Action Level Classification (1903.010).**
	N/A	**19. IF leakage is within Tech Spec 3.4.13 limits,** … N/A
	N/A	**20. IF leak is isolated, … N/A**
Advance to next event at lead evaluator discretion		

Op-Test No.: **2016** Scenario No.: **4** Event No.: **7**

Event Description: **<u>The Major Event is a Condensate pipe rupture which will result in a loss of suction source to both of the MFW Pumps and the Auxiliary FW Pump (P-75)</u>**

Time	Position	Applicant's Actions or Behavior
	CREW	Reference ACA 1203.012D for K05-F7 for OIL SUMP LEVEL HI.
		<u>NOTE</u> • Main Turbine L.O. Conditioner (M-207) equipment drains are routed to the T-27 tank room floor drain system which drain to the NE (#3) oil sump. • The drain line from the T-27 tank room to the NE (#3) oil sump leaks into the surrounding soil. Consequently, Turbine Lube Oil Tank T-27 Rm Floor Drn (FYD-138) is throttled open ½ turn (should not be closed), in order to allow oil to drain freely into the NE oil sump and not remain standing in the drain line. Maintaining only ½ turn open allows the sump pump to keep up with any drain flow.
	CRS	1. <u>IF</u> caused by flooding, <u>THEN</u> GO TO Internal Flooding (1203.054).
	N/A	2. Dump sump using Turbine Building Draining System (1104.044), "Turbine Building Oil Sump Dump" section.
	N/A	3. <u>IF</u> oil leakage, <u>THEN</u> secure source of leak.
	CRS	4. <u>IF</u> condensate leak is suspected, <u>THEN</u> GO TO Annunciator K06 Corrective Action (1203.012E) and perform actions for Hotwell Level Low (K06-F7).
	CRS	Reference ACA 1203.012E for K06-F7 for HOTWELL LEVEL HI/LO.
<u>EXAMINER NOTE:</u> Once the field operator is asked to investigate the cause of the alarm, he will report back that there is a large Condensate System leak in the bowling alley near the polishers. This report will Cue the crew to trip the reactor.		
	N/A	1. <u>IF</u> hotwell level high, <u>THEN</u> perform the following: … N/A
		<u>NOTE</u> Cond E-11A Hotwell Level Lo (LS-2872) actuation prevents start of Condensate Pumps.
		2. <u>IF</u> hotwell level low, <u>THEN</u> perform the following:
	BOP	A. Verify Condensate Makeup (CV-2873) open.
	N/A	B. <u>IF</u> valve does <u>NOT</u> open automatically, … N/A
		C. <u>IF</u> breaker thermal overload is tripped, … N/A
		D. <u>IF</u> CV-2873 still does <u>NOT</u> function, … N/A
		E. <u>WHEN</u> level rises to ~51%, … N/A

Op-Test No.: **2016** Scenario No.: **4** Event No.: **7**

Event Description: **The Major Event is a Condensate pipe rupture which will result in a loss of suction source to both of the MFW Pumps and the Auxiliary FW Pump (P-75)**

Time	Position	Applicant's Actions or Behavior
		NOTE Condensate Pumps (P-2A thru C) need 17' submergence at full vacuum for NPSH at 8400 gpm. The pump suction up to the bottom of the Condenser hotwell provides 22' submergence.
	CREW CT ATC BOP	3. IF hotwell level is low AND can NOT be recovered, THEN perform the following prior to the hotwell going empty: A. Verify the reactor tripped, initiate EFW and perform Reactor Trip (1202.001), while continuing here. B. IF any Main Feedwater Pump or the Aux Feed Pump is running, THEN verify EFW initiated AND trip the running feedwater pump(s). C. Trip all running Condensate Pumps (P-2A thru C).
EXAMINER NOTE: ***CRITICAL TASK***EFIC is defeated and will not automatically actuate. It is a Critical Task that the ATC manually actuates EFW. **Acceptable performance is to initiate EFW prior to the Steam Generator going dry as indicated by a steady level of 6 inches on EFIC Low Range.** P-7A will be the only available EFW Pump since P-7B was initially OOS.		
EXAMINER NOTE: The following guidance is from 1203.054, Internal Flooding Attachment 2, which would be used in the event of a Condensate System leak with lowering hotwell level. Either the ACA or the AOP accomplish the same actions and only one or the other would be used.		
	CRS	**1. Determine leaking system:** A. **IF** indications of Aux Building flooding exist, … N/A B. **IF** indications of Diesel Fuel Vault flooding exist, … N/A C. GO TO appropriate step for leaking system: • Condensate/Feedwater step 3
	N/A	**3. IF Hotwell level is stable,** … **N/A**
	CRS	(Contingency for the above step) 3. **GO TO Attachment 2.**

Op-Test No.: **2016**	Scenario No.: **4**	Event No.: **7**

Event Description: **The Major Event is a Condensate pipe rupture which will result in a loss of suction source to both of the MFW Pumps and the Auxiliary FW Pump (P-75)**

Time	Position	Applicant's Actions or Behavior
	CRS	Transition to OP-1203.054 Attachment 2, Condensate / Feedwater System Leak With Lowering Hotwell Level.
		1. **IF** hotwell level is low **AND** level can **NOT** be recovered, **THEN** perform the following:
	ATC	A. Manually trip the reactor and perform Reactor Trip (1202.001), while continuing with this procedure.
	ATC	B. Manually actuate EFW.
	CT ATC	C. Trip both Main Feed Pumps: • A Main Feed Pump • B Main Feed Pump
	BOP	D. Place Condensate Pumps in PULL-TO-LOCK: • P2A • P2B • P2C
	ATC	E. Perform RT-5.
	N/A	F. **GO TO step 6**.
EXAMINER NOTE: Step 6 deals with recovery efforts, such as isolating the leak, de-energizing wetted equipment, etc. These actions will not be performed during the scenario.		
	CRS	Reference EOP 1202.001, Reactor Trip
	ATC	1. **Depress Reactor Trip PB.** A. Verify all rods inserted **AND** reactor power dropping.
	BOP	2. **Depress Turbine trip PB.** A. Check Turbine throttle and governor valves closed.

Op-Test No.: **2016** Scenario No.: **4** Event No.: **7**

Event Description: **The Major Event is a Condensate pipe rupture which will result in a loss of suction source to both of the MFW Pumps and the Auxiliary FW Pump (P-75)**

Time	Position	Applicant's Actions or Behavior
	ATC / BOP	**3. Check adequate SCM.**
	CRS	**4. Perform the following:** • **Advise Shift Manager to implement Emergency Action Level Classification (1903.010).** • Direct Control Board Operators to monitor floating steps
	ATC	5. Verify Orifice Bypass (CV-1223) demand adjusted to zero.
	BOP	6. Open BWST T3 Outlet (CV-1407 or CV-1408) to operating HPI pump.
	ATC	7. IF Emergency Boration is not in progress, THEN adjust Pressurizer Level Control setpoint to 100".
	ATC	8. Control RCS press within limits of Figure 3 (RT-14).
	BOP N/A N/A N/A N/A	**9. Check for proper electrical response (RT-19).** A. **IF** all 4160V buses are de-energized, ... N/A B. **IF** only EDG power is supplying 4160V buses, … N/A C. **IF** 4160V bus A3 or A4 is de-energized, … N/A D. **IF** 4160V bus A1 or A2 is de-energized, … N/A
		CAUTION The following step will result in load shed of non-vital 4160V buses A1 and A2.
		NOTE Startup XFMR SU2 is considered available if all the following conditions are met: • SU2 voltage ≥ 146KV with SU2 voltage regulator in service (C10 indication) or SU2 voltage ≥ 159KV with SU2 voltage regulator out of service • Either Russellville East or Pleasant Hill 161KV transmission line in service • SU2 load shedding enabled • No Unit 2 buses powered from SU2 SU2 voltage regulator 3% reduction disabled
	ATC	10. Check OP HPI pump supplying normal Makeup and Seal Injection.

Op-Test No.: _**2016**_ Scenario No.: __**4**__ Event No.: _**7**___

Event Description: __**The Major Event is a Condensate pipe rupture which will result in a loss of suction source to both of the MFW Pumps and the Auxiliary FW Pump (P-75)**_______________

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE: After EFW is actuated, continue in Reactor Trip until you are satisfied with the crews performance, then proceed to the next event. The following Floating Step in the Reactor Trip EOP, will cause the CRS to transition to Overheating.		
		• **IF** all MFW and EFW is lost, **THEN GO TO 1202.004, "OVERHEATING"** procedure.
Advance to next event at lead evaluator discretion		

Op-Test No.: **2016** Scenario No.: **4** Event No.: **8**

Event Description: **P-7A trip resulting in a total loss of MFW and EFW. CRS will transition to the Overheating EOP.**

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE: Record time P-7A trips for start of Critical Task (20 minutes) acceptance criteria for initiating of at least one HPI Pump operating at full flow and the ERV cycled open.		
	CRS	Reference Overheating EOP
	CREW	Entry Conditions • RCS temp rising above either: 580°F T-hot with any RCP on **OR** 610°F CET temp with all RCPs off, following a Reactor trip • Loss of all feedwater (MFW and EFW) following a Reactor trip
	ATC / CRS	**1. IF any of the following criteria is met before overheating is corrected:** • **ERV opens in AUTO** • **RCS press ≥ 2450 psig** • **RCS press approaches NDTT Limit (Figure 3)** • **Overheating causes SCM to become inadequate** **THEN GO TO step 5.**
	ATC CRS	**2. Perform the following:** • **Verify proper EFW actuation and control (RT-5).** • **Direct Control Board Operators to monitor Floating Steps.**

Op-Test No.: **2016** Scenario No.: **4** Event No.: **8**

Event Description: **P-7A trip resulting in a total loss of MFW and EFW. CRS will transition to the Overheating EOP.**

Time	Position	Applicant's Actions or Behavior
		3. IF EFW cannot be placed in service, THEN perform the following:
	N/A	A. **IF** Main or Aux Feedwater Pump is available, **THEN** refill SG using RT-16.
		1) **GO TO step 5.**
		3.A Contingency:
	ATC	A. Close Main Feedwater Isolation valves: • CV-2630 • CV-2680
		3.B. Restore EFW using Annunciator K12 Corrective Action (1203.012K), while continuing with this procedure.
	ATC	C. Place EFW CNTRL valves in HAND **AND** close: SG A: CV-2645, CV-2646 SG B: CV-2647, CV-2648
	ATC	D. Place EFW Pump P7B in PULL-TO-LOCK.
	ATC	E. Verify EFW Pump Turbine K3 Steam Admission Valves in MANUAL **AND** closed: • CV-2613 • CV-2663

Op-Test No.: **2016** Scenario No.: **4** Event No.: **8**

Event Description: **P-7A trip resulting in a total loss of MFW and EFW. CRS will transition to the Overheating EOP.**

Time	Position	Applicant's Actions or Behavior
	BOP	**4. Reduce running RCPs to one per loop.** A. **IF** SG Tube-to-Shell ΔT reaches 60°F (tubes hotter) **AND** SCM is adequate, **THEN** trip running RCP(s). 1) Do **not** restart an RCP until SG Tube-to-Shell ΔT is $\leq$ 50°F (tubes hotter).
	N/A	**5. IF overheating has been corrected, THEN GO TO 1202.001, "REACTOR TRIP" procedure.**
EXAMINER NOTE: Overheating is not corrected.		
EXAMINER NOTE: The following are the contingency actions for Step 5 above.		
		5. **IF** any of the following criteria is met: * ERV opens * RCS press $\geq$ 2450 psig * RCS press approaches NDTT Limit (Figure 3) * Secondary feed **not** expected to become available * Overheating causes SCM to become inadequate **THEN** while continuing attempts to restore secondary feed, perform the following:
	BOP	A. Initiate HPI cooling (RT-4). 1) Record time full HPI flow initiated for reference in step 11: ____________
	N/A	B. **IF no** HPI pumps are available, … N/A
	N/A	C. **IF** ERV **cannot** be opened, … N/A

Op-Test No.: **2016** Scenario No.: **4** Event No.: **8**

Event Description: **P-7A trip resulting in a total loss of MFW and EFW. CRS will transition to the Overheating EOP.**

Time	Position	Applicant's Actions or Behavior
	N/A CRS	D. **IF** SG Tube-to-Shell ΔT reaches 60°F (tubes hotter) **AND** SCM is adequate, **THEN** trip the running RCP(s). 1) Do **not** restart an RCP until SG Tube-to-Shell ΔT is ≤ 50°F (tubes hotter). **E. Continue efforts to restore feedwater** AND **continue with this procedure.**
	ATC	**6. Check ESAS ACTUATION alarms clear on K11.**
	ATC	**7. Check adequate SCM.**
	ATC	8. IF Makeup Tank level drops below 18", THEN close Makeup Tank Outlet (CV-1275).
	ATC	9. Check Letdown in service.
	ATC	10. Control RCS press within limits of Figure 3 (RT-14).
	ATC	11. Check CET temps stable or dropping.
EXAMINER NOTE: The following step describe the BOP actions for RT-4. Once HPI cooling is in service, the scenario is complete at the discretion of the lead examiner. CET temperatures should be stabilized with the BOP actions in RT-4. RT-4 is a critical task.		
	BOP	Initiate HPI Cooling per RT-4
	ATC	**1. IF RCP Seal Injection is in service,** **THEN place RCP Seal INJ Block (CV-1206) in OVRD.** **OTHERWISE verify RCP Seal INJ Block (CV-1206) closed.**
	BOP	**2. Open both BWST T3 Outlets:** • CV-1407 • CV-1408
	ATC	**3. Verify Electromatic Relief ERV Isolation (CV-1000) open.**

Op-Test No.: **2016** Scenario No.: **4** Event No.: **8**

Event Description: **P-7A trip resulting in a total loss of MFW and EFW. CRS will transition to the Overheating EOP.**

<table>
<tr><th>Time</th><th>Position</th><th>Applicant's Actions or Behavior</th></tr>
<tr><td></td><td>BOP</td><td>4. <u>IF</u> OP or STBY HPI pump is running,
<u>THEN</u> perform the following:

A. <u>WHEN</u> associated BWST T3 Outlet is open,
<u>THEN</u> fully open all associated HPI Block valves:

<u>P36A/B</u>   <u>P36B/C</u>
CV-1219   CV-1227
CV-1220   CV-1228
CV-1278   CV-1284
CV-1279   CV-1285</td></tr>
<tr><td></td><td>BOP</td><td>5. Prevent dead heading HPI pumps by verifying one of the following:

• Both HPI Pump RECIRC Blocks open:

– CV-1300 and CV-1301
<u>OR</u>
Open HPI Block valve(s) as follows:
– Fully open one HPI Block valve associated with ES HPI pump (CV-1220 or CV-1285).

– <u>IF</u> OP and STBY HPI pumps are both off,
<u>THEN</u> fully open one HPI Block valve associated with OP or STBY HPI pump (CV-1220 or CV-1285).</td></tr>
<tr><td></td><td>BOP</td><td>6. Place ES HPI pump in service as follows:

A. Start AUX Lube Oil pump for ES HPI pump.

B. <u>WHEN</u> associated BWST T3 Outlet is open,
<u>THEN</u> start ES HPI pump.

C. Stop AUX Lube Oil pump.

D. Fully open all associated HPI Block valves:

<u>P36A</u>   <u>P36C .</u>
CV-1219   CV-1227
CV-1220   CV-1228
CV-1278   CV-1284
CV-1279   CV-1285</td></tr>
</table>

Op-Test No.: **2016** Scenario No.: **4** Event No.: **8**

Event Description: **P-7A trip resulting in a total loss of MFW and EFW. CRS will transition to the Overheating EOP.**

Time	Position	Applicant's Actions or Behavior
		E. **IF** ERV opens in auto, **THEN** perform **step 11** while continuing.
	BOP	**7. IF OP and STBY HPI pumps are both off, THEN place OP or STBY HPI pump in service as follows:** A. **IF** HPI Pump (P36B) will be used, **THEN** verify the following selected to energized bus: • P36B/P64B Bus Select MOD Control • P64B Transfer Switch B. Start AUX Lube Oil pump for OP or STBY HPI pump. C. **WHEN** associated BWST T3 Outlet is open, **THEN** start OP or STBY HPI pump. D. Stop AUX Lube Oil pump. E. Fully open all associated HPI Block valves: P36A/B — P36B/C CV-1219 — CV-1227 CV-1220 — CV-1228 CV-1278 — CV-1284 CV-1279 — CV-1285
	N/A	**8. IF no HPI pumps are available,** … N/A
	BOP	**9. Close HPI Pump RECIRC Block (CV-1300 or CV-1301).**
	N/A	**10. IF only one train of HPI is available AND RCS press is > 600 psig, THEN throttle HPI Block valve with the highest flow to within 20 gpm of the next highest flow.**

Op-Test No.: **2016**	Scenario No.: **4**	Event No.: **8**

Event Description: **P-7A trip resulting in a total loss of MFW and EFW. CRS will transition to the Overheating EOP.**

Time	Position	Applicant's Actions or Behavior
	ATC	**11. Perform the following to manually cycle ERV <u>AND</u> continue with this procedure:** A. Open ERV. B. **<u>WHEN</u>** either of the following criteria is met, **<u>THEN</u>** place ERV in AUTO: • RCS press drops to 1650 psig if ES is armed • SCM approaches minimum adequate
<u>EXAMINER NOTE</u>: ***CRITICAL TASK*** Record time of at least one HPI Pump operating at full flow and the ERV cycled open. Acceptance criterion for the critical task is within 20 minutes from the time P-7A tripped.		
FREEZE AT THE DISCRETION OF THE LEAD EVALUATOR		

Notes:

SUPPORTING DOCUMENTATION FOR CRITICAL TASKS

ANO-1 has developed a document that utilizes technical basis documents and input from Operations Management to define acceptable performance for critical tasks. The following pages come from that document.
At the end of each critical task page, is the applicable criteria discussion pertaining to 2016-1 exam.

CT-10 **Establish FW Flow and Feed SG(s)**

CT based on: Add/Maintain appropriate RCS water mass
CT based on: Mitigate inadequate and maintain adequate heat flow from core to heat sinks

TBD Description
Feed available SG(s) using primary or alternate pumps and control SG level at LOSM setpoint.

TBD Conditions
Anytime SCM is lost
PSHT is lost; SCM may or may not exist. FW flow control must be controlled to maintain/initiate PSHT.

Associated GEOG Bases:

Heat removal from the reactor coolant by the SGs is required for a range of LOCAs to satisfy the acceptance criteria of 10 CFR 50.46. For this range of LOCAs, the RCS inventory will decrease causing a loss of natural circulation (i.e. during the transition from saturated natural circulation to boiler condenser cooling), resulting in a period of little primary to secondary heat transfer. This can cause the RCS to heat up and repressurize causing a decrease in MU/HPI flow rate such that MU/HPI flow by itself may not be sufficient for keeping the core covered and adequately cooled. However, for this range of LOCAs enough reactor coolant will be lost out the break, prior to any core uncovering, to provide a sufficient steam volume in the primary side of the SG tubes for boiler condenser cooling to occur. Boiler condenser cooling will reduce RCS pressure so that MU/HPI flow rate can be increased to a value where its heat removal rate matches the decay heat generation rate such that peak clad temperatures remain within acceptable limits.

ANO Version(s)
(1) EFW should be restored to establish PSHT prior to loss of adequate SCM at <30°F due to CET temperature rise.
(2) EFW should be manually started within five minutes of tripping the reactor.
(3) Bus 1 and Bus 2 EFW pushbuttons on Train A and Train B Remote Matrices depressed within five minutes of tripping A and B Main Feedwater Pumps.
(4) EFW should be manually started to establish the preferred method of core cooling (PSHT). This should be accomplished within five minutes of the LOOP.
(5) Manually actuate EFW before A OTSG level indicates 6 inches (dry).
(6) Prompt identification of the loss of NNI power should be accomplished with 5 minutes of receipt of the loss of NNI Power. To assure the RCS is being cooled using the EFW.

SES used

Justification for ANO:

(1) In both of these scenarios, all feedwater sources have been lost and the capability to restore EFW is subsequently restored to the crew. The criterion to establish feedwater flow from the restored source before SCM is lost provides reasonable time for the crew to reestablish PSHT before core safety is challenged.

(2)(3)(4) In these scenarios, Reactor Trip Immediate Actions are occurring at the same time feedwater sources are lost, 5 minutes provides a reasonable time for the crew to determine that the safety function has not been met and to initiate appropriate actions to restore the safety function.

(5) Manually actuating EFW before the A OTSG indicates dry keeps the OTSG available as a heat removal source once the MSIV has been closed to isolate the overcooling. If the SG is allowed to boil dry, it will require a lengthy restoration of level to return it to available status.

(6) The 5 minute criterion is consistent with (2), (3), and (4) above. Identification of the loss of NNI power allows for the crew to transition to appropriate procedural guidance and to assure RCS cooling is accomplished using EFW.

For the 2016-1 ILO NRC Exam criteria (5) above, is the acceptance criteria for initiating EFW. Acceptable performance is to initiate EFW prior to the Steam Generator going dry as indicated by a steady level of 6 inches on EFIC Low Range.

CT-14 **Initiate HPI Cooling**

CT based on: Mitigate inadequate and maintain adequate heat flow from core to heat sinks

TBD Description

Maintain adequate core cooling when 1^0 to 2^0 heat transfer is not adequate or will be intentionally terminated.

TBD Conditions

Mitigating a Loss of Heat Transfer when there is no feedwater or SCM is lost
Mitigating Excessive Heat Transfer and SGTR and 1^0 to 2^0 heat transfer is intentionally terminated
LOSM when 1^0 to 2^0 heat transfer is not adequate and SCM has not been restored

Associated GEOG Bases:

HPI flow supplied to the core and subsequently released from the pressurizer (i.e., through the PORV and/or pressurizer safety valves) can provide adequate core cooling if all feedwater is lost. This has been determined by an analysis that used 10CFR50 Appendix K assumptions for all inputs except decay heat; the input assumption for decay heat was: 1.0 x (ANS 1971 decay heat value). This analysis showed that one HPI pump started at full flow within 20 minutes of the loss of feedwater, in conjunction with mass and energy removal through only the pressurizer safety valves (i.e., no PORV flow), was sufficient to cool the core (criteria of 10CFR50.46 were not violated). This situation describes RC pressure near the pressurizer safety valve setpoint.

If all feedwater is lost, the action to establish HPI cooling must be made expeditiously in order to establish core cooling before too much RC is lost. For this reason, if all feedwater is lost, HPI cooling should be established when or before the RCS pressure reaches the PORV open setpoint (i.e., the first automatic PORV lift following loss of all feedwater). This initiation criteria is appropriate, since it represents the point when RC inventory will commence being lost. Further, keying initiation of HPI cooling to RC pressure avoids the use of time as an operational criteria.

Whenever HPI cooling is initiated and only one HPI pump is operable then the PORV must be maintained open. While analysis indicated that one HPI pump operating in conjunction with pressurizer safety valves can adequately cool the core, it also indicated a small margin of collapsed liquid level to core uncovery (this margin was greater for two HPI pump operation). Promptly opening the PORV reduces the rate at which the net RCS inventory decreases, hence, the margin to core uncovery for this limited makeup condition is increased. This means that RCS inventory loss throughout the transient will not be as great as it would be if the PORV were not opened or if PORV opening was delayed. Due to the minimum margins resulting from HPI cooling with only one HPI pump operating, it has been determined that the PORV must be opened for this situation.

The RC pressure must not exceed the RV P-T limit. Therefore, if the RC pressure increases to the RV P-T limit following a loss of primary to secondary heat transfer, the PORV should be opened (i.e., to limit RC pressure increase) and HPI pumps started. The HPI flow should be throttled as necessary to try and keep the RC pressure below the RV P-T limit.

If PTS guidance is invoked, or will be invoked due to HPI initiation, then RC pressure must be controlled in accordance with PTS guidance per Rule 3.0. After initiating HPI and opening the PORV, throttling HPI may be necessary to maintain RC pressure in accordance with PTS guidance.

ANO Version(s)
At least one HPI pump operating at full flow (its four HPI nozzles full open) and the ERV cycled open within 20 minutes of P-7A EFW pump tripping.

SES used

Justification for ANO:
The 20 minutes for this criterion is from the basis document analysis that shows that initiation from at least one HPI pump within 20 minutes of the loss of feedwater, in conjunction with only Pzr safety valves lifting, was sufficient to cool the core.

For the 2016-1 ILO NRC Exam, the criterion above is the acceptance criteria for initiating HPI Cooling. Acceptable performance is to initiate HPI Cooling within 20 minutes of the loss of all Feedwater and Emergency Feedwater. This time begins when P-7A trips.

VERIFY PROPER EFW ACTUATION AND CONTROL

1. Verify EFW actuation indicated on C09:

Train A:
- Bus 1
- Bus 2

Train B:
- Bus 1
- Bus 2

NOTE
Table 1 contains EFW fill rate and level bands for various plant conditions.

**2. Verify at least one EFW pump (P7A or P7B) running with flow to SG(s) through applicable
EFW CNTRL valve(s).**

SG A		**SG B**
CV-2645	**P7A**	CV-2647
CV-2646	**P7B**	CV-2648

**3. IF SCM is not adequate,
THEN perform the following:**

A. Select Reflux Boiling setpoint for the following:

- Train A
- Train B

NOTE
Table 2 contains examples of less than adequate/excessive EFW flow.

B. Verify EFW CNTRL valves operate to establish and maintain SG levels 370 to 410”.

(3. CONTINUED ON NEXT PAGE)

VERIFY PROPER EFW ACTUATION AND CONTROL

3. (Continued)

1) **IF** both SGs are available,
THEN verify SG level rising and tracking EFIC setpoint until 370 to 410” is established.

a) **IF** EFW flow is less than adequate,
THEN control EFW to applicable SG in HAND to maintain ≥ 340 gpm to applicable SG until level is 370 to 410”.

b) **IF** EFW flow is excessive
AND
> 340 gpm to either SG,
THEN throttle EFW to applicable SG in HAND to limit SG depressurization.
Do **not** throttle below 340 gpm on either SG until SG level is 370 to 410”.

2) **IF** only one SG is available,
THEN feed available SG in HAND at ≥ 570 gpm until SG level is 370 to 410”.

3) **IF** EFW is being controlled in HAND
AND
SG press drops below 720 psig due to EFW flow induced overcooling,
THEN continue feeding at required minimum rate
AND perform the following:

a) Bypass MSLI by momentarily placing SG Bypass toggle switch on each EFIC cabinet Initiate module in BYPASS.

- C37-3
- C37-4
- C37-1
- C37-2

b) Place applicable EFW CNTRL valves in VECTOR OVERRIDE:

SG A		SG B
CV-2645	**P7A**	CV-2647
CV-2646	**P7B**	CV-2648

c) Place applicable EFW ISOL valves in MANUAL.

SG A		SG B
CV-2627	**P7A**	CV-2620
CV-2670	**P7B**	CV-2626

VERIFY PROPER EFW ACTUATION AND CONTROL

4. IF SCM is adequate,
THEN perform the following:

CAUTION
Excessive EFW flow can result in loss of SCM due to RCS shrinkage.

NOTE

- Table 2 contains examples of less than adequate/excessive EFW flow.
- Expect CETs to rise until natural circ conditions are established. If EFW flow control is in HAND, additional flow may not be necessary to prevent rising CETs until natural circ conditions are established.

A. Verify EFW CNTRL valves operate to establish and maintain applicable SG level band per Table 1.

1) **IF** EFW flow is less than adequate
OR
EFW flow is excessive,
THEN control EFW to applicable SG in HAND as necessary to ensure the following:

- Maintain sufficient EFW flow to prevent rise in CET temp.
- Maintain continuous EFW flow until applicable level band is reached.
- Maintain sufficient EFW flow to ensure SG level is either stable **OR** rising until applicable level band is reached.

5. IF all RCPs are off,
THEN check primary to secondary heat transfer in progress indicated by all of the following:

- T-cold tracking associated SG T-sat (Fig. 2)
- T-hot tracking CET temps
- T-hot/T-cold ΔT stable or dropping

6. Monitor EMERGENCY FEEDWATER and EFIC alarms on K12.

VERIFY PROPER EFW ACTUATION AND CONTROL

Table 1

EFIC Automatic Level Control Setpoints

Condition	Level Band	Automatic Fill Rate
Any RCP running	20 to 40”	No fill rate limit
All RCPs off and Natural Circ selected	300 to 340”	2 to 8”/min
All RCPs off and Reflux Boiling selected	370 to 410”	2 to 8”/min

Table 2

Examples of Less Than Adequate EFW Flow Indications

- SG level < 20” and no EFW flow indicated
- All RCPs off and SG level not tracking EFIC calculated setpoint
- All RCPs off and EFIC level setpoint not trending toward applicable level band

Examples of Excessive EFW Flow Indications

- SG press drops $\geq$ 100 psig due to EFW flow induced overcooling
- SCM approaching minimum adequate due to EFW flow induced overcooling
- EFW CNTRL valve open with associated SG level > applicable setpoint level band

END

RT-14

CONTROL RCS PRESS

NOTE

- PTS limits apply if any of the following has occurred:
  - HPI on with all RCPs off
  - RCS C/D rate > 100°F/hr with Tcold < 355°F
  - RCS C/D rate > 50°F/hr with Tcold < 300°F
- Once invoked, PTS limits apply until an evaluation is performed to allow normal press control.
- When PTS limits are invoked OR SGTR is in progress, PZR cooldown rate limits do not apply.
- PZR cooldown rate <100°F/hr.

1. **IF PTS limits apply or RCS leak exists,**
   THEN maintain RCS press low within limits of Figure 3.

2. **IF RCS press is controlled AND will be reduced below 1650 psig,**
   THEN bypass ESAS as RCS press drops below 1700 psig.

3. **IF PZR steam space leak exists,**
   THEN limit RCS press as PZR goes solid by one or more of the following:

   A. Throttle makeup flow.

   B. **IF** SCM is adequate,
   THEN throttle HPI flow by performing the following:

      1) Verify both HPI Recirc Blocks open:

         - CV-1300
         - CV-1301

      2) Throttle HPI.

   C. Raise Letdown flow.

      1) **IF** ESAS has actuated,
      THEN unless fuel damage or RCS to ICW leak is suspected, restore Letdown per RT-13.

   D. Verify Electromatic Relief ERV Isolation open (CV-1000)
   AND cycle Electromatic Relief ERV (PSV-1000).

CONTROL RCS PRESS

4. IF RCS press is high,
THEN limit press using one or more of the following:

A. Throttle makeup flow.

B. Throttle HPI flow by performing the following:

1) Check adequate SCM **AND** any of the following conditions met:

- HPI Cooling (RT-4) **not** in progress
- CET temps dropping
- RCS press rising with Electromatic Relief ERV (PSV-1000) open

2) Verify both HPI Recirc Blocks open:

- CV-1300
- CV-1301

3) Throttle HPI.

C. **IF** RCP is running,
THEN operate Pressurizer Spray Control (CV-1008) in HAND.

D. **IF** PZR AUX Spray is in service,
THEN throttle Pressurizer AUX Spray (CV-1416) open.

E. Place Pressurizer Heaters in OFF.

F. Raise Letdown flow.

1) **IF** ESAS has actuated,
THEN unless fuel damage or RCS to ICW leak is suspected restore Letdown per RT-13.

G. Verify Electromatic Relief ERV Isolation open (CV-1000)
AND cycle Electromatic Relief ERV (PSV-1000).

(4. CONTINUED ON NEXT PAGE)

CONTROL RCS PRESS

4. (Continued)

H. **<u>IF</u>** desired to secure HPI pump(s),
<u>THEN</u> perform the following:

1) Start AUX Lube Oil pumps for associated HPI pump(s):

P36A	**P36B**	**P36C**
P64A	P64B	P64C

2) Stop desired HPI pump(s):

- P36A
- P36B
- P36C

3) Close all associated HPI Block valves:

P36A/B	**P36B/C**
• CV-1219	• CV-1227
• CV-1220	• CV-1228
• CV-1278	• CV-1284
• CV-1279	• CV-1285

5. <u>IF</u> RCS press is low,
<u>THEN</u> raise press using one or more of the following:

A. Raise makeup flow.

B. Raise HPI flow or initiate HPI per RT-2.

C. **<u>IF</u>** RCP is running,
<u>THEN</u> verify Pressurizer Spray Control (CV-1008) closed.

D. Reduce Letdown flow.

E. Place Pressurizer Heaters in MANUAL.

(5. CONTINUED ON NEXT PAGE)

CONTROL RCS PRESS

5. (CONTINUED)

CAUTION

If HPI cooling is in progress, Electromatic Relief ERV Isolation (CV-1000) must be left open until HPI cooling is no longer required.

F. Verify Electromatic Relief ERV (PSV-1000) or Electromatic Relief ERV Isolation (CV-1000) closed.

CAUTION

With RCS solid, 1°F temp change can cause 100 psig press change.

6. IF PZR is solid,
THEN RCS press may also be controlled by varying RCS temperature.

- Raise RCS temp to raise RCS press
- Lower RCS temp to lower RCS press

NOTE

Adjusting Pressurizer Level Control setpoint and HPI as necessary to maintain normal makeup flow on-scale will allow CV-1235 to automatically compensate for small changes in RCS leak rate and cooldown rate.

7. IF normal makeup is in service
AND
HPI is in service,
THEN adjust Pressurizer Level Control setpoint and HPI as necessary to maintain normal makeup flow on-scale.

END

CHECK PROPER ELECTRICAL RESPONSE

1. **Check 125 V DC Bus D01 energized:**

   - **Turbine Trip Solenoid Power Available light lit**
   - **Breaker position indications available on left side of C10**

   A. **IF** 125 V DC Bus D01 is de-energized,
   THEN inform CRS to perform “Loss of D01” section of Loss of 125 V DC (1203.036) in conjunction with Reactor Trip procedure, while continuing.

2. **Check Main Generator and Exciter Field breakers open.**

   - **5114**
   - **5118**
   - **Exciter Field breaker**

   A. **IF** Main Generator and Exciter Field breakers are closed,
   THEN perform the following:

      1) **IF** 125 V DC Bus D01 is energized,
      THEN perform the following:

         a) Inform the CRS.

         b) Manually trip Main Generator breakers:

            - 5114
            - 5118

         c) Manually trip Exciter Field breaker.

      2) **IF** 125 V DC Bus D01 is de-energized,
      THEN leave Main Generator and Exciter Field breakers closed.

CHECK PROPER ELECTRICAL RESPONSE

3. Check DGs off:

- **DG1**
- **DG2**

A. **IF** DG is running,
THEN perform the following:

- Verify associated SERV WTR to DG CLRs open:

DG1	**DG2**
CV-3806	CV-3807

- Inform CRS that DG is running

4. Check vital 4160 V buses energized:

- **A3**
- **A4**

A. **IF** either 4160 V bus A3 or A4 is de-energized,
THEN inform CRS.

5. Check non-vital 4160 V buses energized:

- **A1**
- **A2**

A. **IF** either 4160 V bus A1 or A2 is de-energized,
THEN inform CRS.

END

INITIATE HPI COOLING

1. **IF RCP Seal Injection is in service,**
   THEN place RCP Seal INJ Block (CV-1206) in OVRD.
   OTHERWISE verify RCP Seal INJ Block (CV-1206) closed.

2. **Open both BWST T3 Outlets:**

   - CV-1407
   - CV-1408

3. **Verify Electromatic Relief ERV Isolation (CV-1000) open.**

4. **IF OP or STBY HPI pump is running,**
   THEN perform the following:

   A. **WHEN** associated BWST T3 Outlet is open,
   THEN fully open all associated HPI Block valves:

P36A/B	P36B/C
CV-1219 CV-1220 CV-1278 CV-1279	CV-1227 CV-1228 CV-1284 CV-1285

5. **Prevent dead heading HPI pumps by verifying one of the following:**

   - Both HPI Pump RECIRC Blocks open:
     - CV-1300
     - CV-1301

   OR

   - Open HPI Block valve(s) as follows:
     - Fully open one HPI Block valve associated with ES HPI pump (CV-1220 or CV-1285).
     - **IF** OP and STBY HPI pumps are both off,
       THEN fully open one HPI Block valve associated with OP or STBY HPI pump (CV-1220 or CV-1285).

INITIATE HPI COOLING

6. Place ES HPI pump in service as follows:

A. Start AUX Lube Oil pump for ES HPI pump.

B. **WHEN** associated BWST T3 Outlet is open,
THEN start ES HPI pump.

C. Stop AUX Lube Oil pump.

D. Fully open all associated HPI Block valves:

P36A	P36C
CV-1219 CV-1220 CV-1278 CV-1279	CV-1227 CV-1228 CV-1284 CV-1285

E. **IF** ERV opens in auto,
THEN perform **step 11** while continuing.

**7. IF OP and STBY HPI pumps are both off,
THEN place OP or STBY HPI pump in service as follows:**

A. **IF** HPI Pump (P36B) will be used,
THEN verify the following selected to energized bus:

- P36B/P64B Bus Select MOD Control
- P64B Transfer Switch

B. Start AUX Lube Oil pump for OP or STBY HPI pump.

C. **WHEN** associated BWST T3 Outlet is open,
THEN start OP or STBY HPI pump.

D. Stop AUX Lube Oil pump.

E. Fully open all associated HPI Block valves:

P36A/B	P36B/C
CV-1219 CV-1220 CV-1278 CV-1279	CV-1227 CV-1228 CV-1284 CV-1285

INITIATE HPI COOLING

8. **<u>IF</u> <u>no</u> HPI pumps are available,**
<u>THEN</u> notify CRS to perform Contingency Actions for <u>no</u> HPI pumps available
<u>AND</u> GO TO step 12.

9. **Close HPI Pump RECIRC Block (CV-1300 or CV-1301).**

10. **<u>IF</u> only one train of HPI is available**
<u>AND</u>
RCS press is > 600 psig,
<u>THEN</u> throttle HPI Block valve with the highest flow to within 20 gpm of the next highest flow.

11. **Perform the following to manually cycle ERV <u>AND</u> continue with this procedure:**

A. Open ERV.

B. **<u>WHEN</u>** either of the following criteria is met,
<u>THEN</u> place ERV in AUTO:

- RCS press drops to 1650 psig if ES is armed
- SCM approaches minimum adequate

<u>CAUTION</u>
Electromatic Relief ERV Isolation (CV-1000) is left open until HPI cooling is no longer required to maximize HPI cooling flow.

1) **<u>IF</u>** ERV fails open,
<u>THEN</u> do **<u>not</u>** close Electromatic Relief ERV Isolation (CV-1000).

C. **<u>WHEN</u>** RCS press reaches 2400 psig
<u>OR</u>
approaches NDTT Limit on Figure 3,
<u>THEN</u> repeat **step 11** until ERV can remain open with the following criteria met:

- RCS press > 1650 psig if ES is armed
- SCM adequate

D. **<u>IF</u>** ERV is closed
<u>AND</u>
CET temp rise causes adequate SCM to be lost, without a drop in RCS press,
<u>THEN</u> open ERV
<u>AND</u> leave open to maximize cooling.

INITIATE HPI COOLING

12. Turn off all Pressurizer Heaters.

13. Trip all but one RCP.

14. Maximize RB cooling as follows:

A. Verify all four RB Cooling Fans running:

- VSF1A
- VSF1B
- VSF1C
- VSF1D

B. Open RB Cooling Coils Service Water Inlet/Outlet valves:

- CV-3812/CV-3814
- CV-3813/CV-3815

C. Unlatch key-locked Chiller Bypass Dampers:

- SV-7410
- SV-7411
- SV-7412
- SV-7413

15. Isolate possible RB leak paths as follows:

A. **IF** RB Sump draining is in progress,
THEN close RB Sump to AUX Sump valves:

- CV-4400
- CV-4446

B. On C25, depress STOP for RB Leak Detector RX-7460 Sample Pump Control (PB-7462).

C. On C26, close RB Leak Detector Isolations (SV-7454 and SV-7456) by placing HS-7454 in CLOSE BOTH.

END

Facility: **ANO-1** Scenario No.: **5** Op-Test No.: **2016-1**

Examiners: ______________ Operators: ______________

Initial Conditions: **60% power, ICS runback defeated, EH Oil Pump auto start defeated**

Turnover: **60% Power, Secure #1 EDG during Surveillance Testing**
P-28A – "A" MFWP Emergency Lube Oil Pump OOS.

Event No.	Position	Event Type*	Event Description
1	BOP	N	Unload and secure #2 EDG
2	ATC CRS	C TS	Dropped rod in Group 6
3	ATC	I	ICS signal to "A" MFW Pump fails low
4	BOP	I	Gland Steam Pressure Controller fails closed
5	BOP	C	EH Oil Pump trips with failure of the standby pump to auto start
6	All	C / TS	SG Tube Leak requiring shutdown
7	All	M	SG Tube Rupture
8	ATC	C / CT	2 Stuck Rods post trip
9	ATC	C / CT	TBVs close due to loss of vacuum interlock

*(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS) Technical Specification, (CT) Critical Task

Target Quantitative Attributes (Per Scenario; See Section D.5.d)	Actual Attributes
1. Malfunctions after EOP entry (1-2)	2
2. Abnormal events (2-4)	3
3. Major transients (1–2)	1
4. EOPs entered/requiring substantive actions (1–2)	1
5. EOP contingencies requiring substantive actions (0-2)	1
6. EOP based Critical tasks (2–3)	2

Note: 1 of 4 crews tripped the reactor on event 5, and was not credited with a component malfunction on event 6.

NARRATIVE

This scenario starts with plant power at 60%. During turnover the BOP will be directed complete the #2 EDG Surveillance. This will require him to unload and secure the diesel generator.

Following the completion of the surveillance, a rod will drop in (Group 6 Rod 3) which should result in a plant runback to 40% but the automatic runback fails which will require the ATC to manually lower power to 40% using the SG/RX station. Group 6 Rod 3 will be declared inoperable and T.S. 3.1.4 Condition A.

After power is reduced to 40%, the ICS signal to the A MFW Pump will fail low which will lower Feedwater flow to the A SG. The ATC will trip the A MFW Pump and verify flow to both steam generators.

Next, the Gland Sealing Steam Pressure Controller will fail closed resulting in lowering condenser vacuum. The BOP will throttle open the pressure regulator bypass valve to regain sealing steam to the main turbine.

Next, the running EH Oil Pump will trip with a failure of the standby pump to automatically start. The BOP will be able to manually start the standby EH Oil Pump from the control room to prevent a turbine trip.

Then a small tube leak will develop in excess of the T.S. limit requiring a plant shutdown and entry into T.S. 3.4.13 Condition B. The major event will be an escalation of the tube leak to a Tube Rupture.

Post trip there will be two stuck rods which will require emergency boration, commencing / performing an emergency boration is a critical task for the ATC. The second critical task is to commence a cooldown and depressurization. Initially the TBVs will be utilized for the cooldown. The cooldown is a critical task since lowering the dp between the RCS and the secondary side of the will reduce the tube leak rate. Once the cooldown is in progress Condenser Vacuum will degrade to the point where the Turbine Bypass Valves (TBVs) are interlocked closed, this will require a transition to the Atmospheric Dump Valves (ADVs) in order to continue the cooldown. The scenario will complete once the cooldown is re-established on the ADVs.

PRA / IPE explanation:
(OE) ANO has had a MFWP Control Signal fail without a pump trip.
(OE) Industry events include Tube leak / rupture.

Critical Tasks

CT-23 – Establish and Maintain Reactor Shutdown Requirements, the initiation of emergency boration must occur within 15 minutes of the reactor trip.

CT-7 – Minimize SCM, an RCS cooldown must be commenced prior to the ruptured STEAM GENERATOR reaching 400 inches which could result in increased exposure to the public.

Anticipated Procedures Used in Scenario 5

Event 1
1. 1104.036, Emergency Diesel Generator Operation, Supplement 2 (NOP)

Event 2
1. 1203.012F, ACA for K07-B3
2. 1203.003, Control Rod Drive Malfunction Action, Section 2 (AOP)
3. 1203.045, Rapid Plant Shutdown (AOP)
4. T.S. 3.1.4

Event 3
1. 1203.027, Loss of Feed (AOP)

Event 4
1. 1203.012D, ACA for K05-B4 through C4
2. 1203.012D, ACA for K05-B2
3. 1203.016, Loss of Condenser Vacuum (AOP)
4. 1203.045, Rapid Plant Shutdown (AOP)

Event 5
1. 1203.012D, ACA for K05-C3 & K05-B7

Event 6
1. 1203.012F, ACA for K07-A5
2. 1203.023, Small Tube Leak, Section 1 SG-A Tube Leak (AOP)
3. 1203.014, Control of Secondary System Contamination (AOP)
4. T.S. 3.4.13
5. T.S. 3.7.5

Event 7
1. 1202.006, Tube Rupture (EOP)
2. 1107.001, Electrical System Operations (NOP)
3. 1202.012, Repetitive Tasks, RT-12 (EOP)
4. 1202.012, Repetitive Tasks, RT-14 (EOP)
5. 1202.012, Repetitive Tasks, RT-2 (EOP)

Event 8
1. 1202.006, Tube Rupture (EOP)
2. 1202.012, Repetitive Tasks, RT-12 (EOP)

Event 9
1. 1202.006, Tube Rupture (EOP)

EOP – Emergency Operating Procedure
AOP – Abnormal Operating Procedure
ACA – Annunciator Corrective Actions
NOP – Normal Operating Procedure

List of Initial Conditions and Triggers for Scenario 5

At Time	On Event	Action	Description
00:00:00	None	Insert malfunction RD351	STUCK ROD GROUP 3 ROD 1
00:00:00	None	Insert malfunction RD355	STUCK ROD GROUP 4 ROD 7
00:00:00	None	Insert remote CO_P28A to OFF	CO_P28A A MAIN FEEDWATER PUMP K2A EMERGENCY OIL P28A
00:00:00	None	Insert override DO_PB6704G to Off	GRN LP,OIL PP,TEST START,P28A
None	4	Insert malfunction MS140	GLAND SEAL FAILURE
None	1	Insert malfunction RD294 to 0	DROP ROD GROUP 6 ROD 3 140-0 INCHES
None	1	Insert remote ICSRBD to DISABLE	ICSRBD DISABLE ICS RUNBACK SIGNALS
None	2	Insert malfunction RX598 to 0 in 10	A MFW SPEED DEMAND TO LOVEJOY
None	3	Insert remote CO_P14B to OFF	CO_P14B MAIN TURBINE EH FLUID PUMP
None	3	Insert override DI_HS9201STOP to TRUE	STOP,EH OIL PUMPS P14A,HS-9201
None	5	Insert malfunction RC001 to 0.00500 in 300	OTSG A TUBE RUPTURE 0-40 TUBES
None	6	Insert malfunction RC001 to 0.30000 in 300	OTSG A TUBE RUPTURE 0-40 TUBES
None	7	Insert malfunction MC088 to 6000.00000 in 480	CONDENSER VACUUM LEAK 0-6000 SCFM
None	8	Delete override DI_HS9201STOP to TRUE	STOP,EH OIL PUMPS P14A,HS-9201
None	None	Run Event File P14A START	

Op-Test No.: **2016-1** Scenario No.: **5** Event No.: **1**

Event Description: **Secure #2 EDG per 1104.036, Supplement 2 starting at Step 2.18.4.**

Time	Position	Applicant's Actions or Behavior
T=0	BOP	Reference 1104.036 Supplement 2
	BOP	2.21.4 Perform the following to remove DG2 2.21.4 **PERFORM** the following to remove DG2 from parallel operation: A. **RECORD** Time/Date at which load reduction is commenced: Time/Date _______/________
		NOTE Gradual and uniform load changes minimize engine wear and internal stresses. A 100% load change typically takes ~90 sec. Longer unloading times are acceptable when delays are caused by reactive load adjustments or equipment monitoring.
		CAUTION A delay in opening output breaker at 100 KW when unloading diesel can result in generator motoring which causes lockout relay to actuate and trip DG output breaker and shutdown the engine.
	BOP	B. **PERFORM** the following to unload DG2: • Using DG2 governor control, **UNLOAD** DG2 to 100 KW. • Using DG2 voltage regulator, **MINIMIZE** KVARs. C. **OPEN** DG2 Output Breaker (A-408). D. **RECORD** Time/Date (A-408) opened: Time/Date ______/________

Op-Test No.: **2016-1** Scenario No.: **5** Event No.: **1**

Event Description: **Secure #2 EDG per 1104.036, Supplement 2 starting at Step 2.18.4.**

Time	Position	Applicant's Actions or Behavior
	BOP	E. **IF** an Extended Load Run was **NOT** performed, **THEN SUBTRACT** time recorded in step 2.13.9 from time recorded in step 2.21.4A to determine DG2 Initial Time. • **RECORD** result in Table 2 as DG2 Initial Time. • **MARK** the following as N/A in Table 2: – DG2 Extended Time – DG2 Additional Time – DG2 Total Time
		NOTE Additional Run Time between 2625 and 2750 KW can be requested by Systems and Components Engineering in step 2.2I.21 or step 2.8.10 of Supplement 10, DG2 Endurance Test.
	N/A	F. **IF** an Extended Load Run was performed, … **N/A**
EXAMINER CUE: At Step C, inform applicant that DG2 has ran unloaded for 17 minutes.		
	BOP	2.21.5 **PERFORM** the following to stop diesel: A. Using DG2 governor control, **ADJUST** frequency to 60 Hz. B. Using DG2 voltage regulator, **ADJUST** voltage to 4160 volts. C. **WHEN** DG2 has run unloaded for 17 minutes or longer **AND** as soon as practicable, **THEN** at C10, **DEPRESS** DG2 STOP pushbutton. D. **RECORD** Time/Date DG2 stopped: Time/Date ______/_______

Op-Test No.: **2016-1** Scenario No.: **5** Event No.: **1**

Event Description: **Secure #2 EDG per 1104.036, Supplement 2 starting at Step 2.18.4.**

Time	Position	Applicant's Actions or Behavior
		NOTE • The following Functional Capability Test (Optional) is performed at the request of Systems and Components Engineering. • Being prepared to obtain elapsed time from start signal until DG2 AC voltage exceeds 4000 volts is essential to properly capture data.
	N/A	2.22 **IF** Functional Capability Test has NOT been performed **AND** requested by Systems and Components Engineering, … N/A
	BOP	2.23 RESTORATION

BOOTH: When called, Engine Total Hrs = 1147.2 hrs

EXAMINER CUE: Panel C20 is not modeled in simulator so, when asked at Step 2.23.3, DG2 Watt-hour meter = 305720 KWH.

EXAMINER NOTE: The rest of the surveillance is mostly administrative in nature and not all the panels / readings are modeled in the simulator. The only switch manipulation would be to stop the EDG Room Exhaust Fans after 20 minutes and to verify K01-C4 and K01-D4 are clear. Recommend inserting next malfunction at this time.

Proceed at the discretion of the Lead Examiner

Op-Test No.: **2016-1** Scenario No.: **5** Event No.: **2**

Event Description: **Group 6 Rod 3 drops with ICS runback disabled**

Time	Position	Applicant's Actions or Behavior
		Reference 1203.012F, ACA for K07-B3 for ASYM ROD RUNBACK IN EFFECT
	ATC N/A N/A CRS	1. Verify ICS in track AND running back. 2. IF asymmetric rod runback clearly caused by an ICS failure OR an ICS input signal failure, THEN take manual control of affected ICS station(s) AND return plant to steady-state condition. A. Refer to ICS Abnormal Operation (1203.001). 3. IF necessary, THEN take manual control of the diamond station. A. Reduce reactor power until unit load demand <40%. 4. GO TO Control Rod Drive Malfunction Action (1203.003).
EXAMINER NOTE: It is not necessary to take the diamond station to hand, but the ATC will have to take the SG/Rx to hand and lower power. With ICS in TRACK the ULD is not available for the down power. CRS may go directly to 1203.003, Control Rod Drive Malfunction Action.		
	CRS	Reference 1203.003, Control Rod Drive Malfunction, Section 2
	N/A	**1. IF either of the following conditions exist: … N/A**
	N/A	**2. IF more than one rod drops AND NI power is ≥2%, THEN trip the reactor and perform Reactor Trip (1202.001).**
	CREW	**3. IF a single rod drops, THEN verify ICS runback to 40% of 902 MWe (~360 MWe) OR current generator output is ≤ 40% of 902 MWe (~360 MWe).**
		NOTE Instructions in CRD System Operating Procedure (1105.009) prefer NI power level <37% for recovery of a dropped rod.
	CRS ATC	A. Perform Rapid Plant Shutdown (1203.045) in conjunction with this procedure. B. Adjust ICS demand as needed to reduce AND maintain the following conditions to clear the CRD Withdrawal Inhibited condition, and prevent Out Inhibit condition: • <360 MWe

		• <40% NI power

Op-Test No.: **2016-1** Scenario No.: **5** Event No.: **2**

Event Description: **Group 6 Rod 3 drops with ICS runback disabled**

Time	Position	Applicant's Actions or Behavior
		NOTE • Technical Specifications defines an inoperable rod as follows: – Safety Rod that is not fully withdrawn within one hour, except during performance of rod exercise surveillance (TS 3.1.5). **If the Safety Rod is declared inoperable in TS 3.1.5, then TS 3.1.4 must also be entered.** – Inability to move control rod (SR 3.1.4.2) or APSR (TS 3.1.6). – Rod can not be located with API, RPI or limit lights (TS 3.1.7). Not meeting TS 3.1.7 results in not meeting either TS 3.1.4 or 3.1.6. • If the inoperable control rod is fully inserted, then it is not necessary to consider it inoperable for the purposes of shutdown margin calculations because it has inserted its negative reactivity. • A control rod is considered to be inoperable if it is not free to insert into the core within the required insertion time, or does not have at least one position indicator channel operable, i.e., cannot be located. (Ref. TS 3.1.4 Bases).
EXAMINER NOTE: CRS should enter T.S. 3.1.4 Condition A for the inoperable rod. (Group 6 Rod 3)		
	CRS	**4. IF rod is declared inoperable OR rod is misaligned >6.5% from its group average (misaligned rod position is not used in the rod group average calculation), THEN within 1 hour AND once every 12 hours thereafter, either verify 1.5% available shutdown margin per Reactivity Balance Calculation (1103.015) OR initiate boration to restore SDM to be within COLR limit within 1 hour.**

Op-Test No.: **2016-1** Scenario No.: **5** Event No.: **2**

Event Description: **Group 6 Rod 3 drops with ICS runback disabled**

Time	Position	Applicant's Actions or Behavior
	N/A BOP	A. **IF** control rod is **not** fully inserted, … N/A B. **IF** rod is fully inserted, **THEN** use "Calculation of Shutdown Margin for Shutdown Conditions (Also Reactor Critical with an inoperable control rod)" Worksheet 4 and use "with no known inoperable rod" option.
		NOTE **Control Rod Tech Spec Application Examples (Attachment B) contains information concerning Tech Spec application associated with different control rod failures.**
	CRS	**5. IF rod is declared inoperable OR rod is misaligned >6.5% from its group average (misaligned rod position is not used in the rod group average calculation), THEN perform one of the following:** A. **IF** a safety rod, **THEN** enter TS 3.1.4 and TS 3.1.5. B. **IF** a regulating rod, **THEN enter TS 3.1.4. Condition A**
EXAMINER NOTE: Once the rod is declared inoperable and power reduced to <40%, ready to insert next malfunction at the discretion of the Lead Examiner.		
	CREW	**6. Within 2 hours, perform one of the following:** A. Restore control rod alignment **AND** verify control rod is within 6.5% of group alignment. B. Reduce reactor thermal power to ≤60% of the allowable thermal power (TS 3.1.4) **AND** perform the following: 1) Contact Reactor Engineering **AND** verify the potential ejected rod worth is within the assumptions of the rod ejection analysis within 72 hours. 2) **IF** thermal rated power is >20%, **THEN** perform Power Peaking Check (1103.019)

		within 72 hours.

Op-Test No.: **2016-1** Scenario No.: **5** Event No.: **2**

Event Description: **Group 6 Rod 3 drops with ICS runback disabled**

Time	Position	Applicant's Actions or Behavior
	CRS	**7. Consult Senior Manager, Operations and Reactor Engineering personnel.**
	ATC	**8. Monitor core quadrant tilt for limits specified in COLR, and TS 3.2.4.**
		NOTE PMS turn on codes RIS1, RIS2 and RIS3 indicate SPND output versus SPND string number and core location. The Uncorrected and Corrected SPND reports only indicate SPND output and SPND string. In order to determine a given core location then RIS1, RIS2 or RIS3 may be used.
	BOP	**9. Perform the following:** A. Collect the following plant computer printouts from NASP menu, "OPS Procedure 1203.003" selection: • Uncorrected SPND Signals • Imbalance, Tilt and Rod Index • Corrected SPND Signals

END OF EVENT

Op-Test No.: **2016-1** Scenario No.: **5** Event No.: **3**		
Event Description: **ICS Signal to "A" MFW Pump fails low.**		
Time	**Position**	**Applicant's Actions or Behavior**
EXAMINER NOTE: Expect the crew to identify malfunction prior to any alarms. The expected alarms would be; MFW A/B DELTA P LO (K07-D7), REACTOR IS FEEDWATER LIMITED (K07-C1) and UNIT MASTER IN TRACK (K07-A1). However guidance for the condition is contained in 1203.027 Loss of Feed.		
	CRS	Reference 1203.027, Loss of Feed
	N/A	1. IF either of the following conditions apply: … N/A
	ATC	2. IF both MFWPs are running AND 1 MFWP has failed without tripping, THEN manually trip the bad MFWP.
	ATC	3. IF only one MFWP is operating, THEN verify that Feedwater Pumps Disch Crosstie (CV-2827) is open.
	ATC	4. Verify ICS reduces power … N/A
	ATC	5. Open Pressurizer Spray (CV-1008) in MAN as necessary.
	ATC	6. WHEN RCS pressure starts to drop, THEN verify Pressurizer Spray Control Mode switch in AUTO.
	ATC	7. Verify CV-1008 closes per one of the following setpoints OR isolate it, as necessary, by closing the Spray Isolation (CV-1009). • Normal operation: Closes - 2155 psig • Power >80% AND MFWP trip: Closes - 2030 psig
	CREW	8. Attempt to determine cause of loss of feed and correct it.
BOOTH: If directed report no obvious problems at the A MFW Pump.		
		NOTE A feedwater line rupture in the reactor building may be indicated by rising reactor building temperature, pressure or sump level.
	CRS	9. IF feedwater flow to both SGs is restored AND is sufficient for present power level, THEN stabilize plant AND continue operation as directed by Operations Manager.
END OF EVENT		

Op-Test No.: **2016-1** Scenario No.: **5** Event No.: **4**

Event Description: **Gland Seal Steam Pressure Controller fails closed.**

<table>
<tr><th>Time</th><th>Position</th><th>Applicant's Actions or Behavior</th></tr>
<tr><td></td><td>CRS</td><td>Reference 1203.012D ACA for K05-B4 – E4 for
GS PRESS #3 BRG LO</td></tr>
<tr><td colspan="3"><u>EXAMINER NOTE:</u> This event will also cause a lowering in condenser vacuum which will require the ATC to adjust power due to the inefficiencies occurring.</td></tr>
<tr><td></td><td>BOP</td><td>1. <u>IF</u> Gland Seal Steam Header Press <75 psig,
<u>THEN</u> at C12, slowly open Gland Sealing Steam Main Regulator Bypass (CV-6606).</td></tr>
<tr><td></td><td>ATC</td><td>2. Check the status of the following alarms:
A. GS PRESS #4 BRG LO (K05-C4)
B. GS PRESS #5 BRG LO (K05-D4)
C. GS PRESS #6 BRG LO (K05-E4)</td></tr>
<tr><td></td><td></td><td><u>NOTE</u>
• LPT A Brg #3 GS Supply regulator (CV-6823) and Brg #3 GS Supply Regulator CV-6823 Bypass (GS-6823-3) are located in the East door of the HP Turb Housing.
• “Adjusting Gland Seal Steam Regulators” Attachment B of Gland Seal Steam System (1106.013) contains instructions for regulator operation.</td></tr>
<tr><td></td><td>N/A</td><td>3. <u>IF</u> this is the only GS PRESS BRG LO alarm in, … N/A</td></tr>
<tr><td colspan="3"><u>EXAMINER NOTE</u>: The following steps are a contingency if the GS Pressure is not properly controlled and causes a degradation in vacuum to the point that a power reduction is required.</td></tr>
<tr><td></td><td>CRS</td><td>Reference 1203.012D, ACA for K05-B2 for
CONDENSER VACUUM LO</td></tr>
<tr><td></td><td>CRS</td><td>1. <u>IF</u> vacuum continues to degrade, <u>THEN</u> refer to Loss of Condenser Vacuum (1203.016).</td></tr>
<tr><td></td><td>BOP</td><td>2. <u>IF</u> cause of degraded vacuum is known, <u>AND</u> either,
* MWe is <270 AND vacuum stabilizes >26.5" Hg, OR
* MWe is >270 AND vacuum stabilizes >24.5" Hg,
<u>THEN</u> adjust alarm setpoints to near but below current vacuum reading using Plant Computer points Y2850 and Y2851 per Plant Computer Operation (1105.010).
<u>OTHERWISE</u> refer to Loss of Condenser Vacuum (1203.016).</td></tr>
</table>

Op-Test No.: **2016-1** Scenario No.: **5** Event No.: **4**

Event Description: **Gland Seal Steam Pressure Controller fails closed.**

Time	Position	Applicant's Actions or Behavior
	CRS	Reference 1203.016, Loss of Condenser Vacuum
	ATC	**1. Commence reducing turbine load to stabilize vacuum.** • **IF** MWe is >270 and vacuum is <24.5" Hg **THEN** trip the turbine. • **IF** MWe is <270 and vacuum is <26.5" Hg, **THEN** trip the turbine.
	CRS	**2. Refer to Rapid Plant Shutdown (1203.045).**
	BOP	**3. Verify proper condenser vacuum pump operation as follows:** A. Condenser Vacuum Pumps (C-5A and C-5B on C02) running. 1) IF Condenser Vacuum Pump (C-5A/B) autostarts, THEN place handswitch in normal after start. B. Adequate Condenser Vacuum Pump (C-5A/B) Separator Tank (T-75A, T-75B) water level. C. Condenser Vacuum Pump Cooler (E-46A/B) ACW Outlet Temperature (TI-4020, TI-4022) normal.
		NOTE Under ideal conditions, the condenser vacuum pumps can only achieve approximately 26" Hg in the hogging mode of operation.
	BOP	D. **IF** Main Condenser vacuum continues to degrade below 26" Hg, **THEN** consider placing the local Condenser Vacuum Pump AUTO-HOG handswitches (HS-3636 and HS-3638) in HOG position, prior to going below 25" Hg.
	N/A	E. **IF** outside ambient temperature is below freezing, … N/A
		NOTE The following step automatically sets the CONDENSER VACUUM LO (K05-B2) alarm setpoints to 24.7" or 26.7" Hg, depending upon MWe output to PMS.
	BOP	**4. From PMS Alarm menu, set the Transient Low Vacuum Alarm:** **"Y", Enter, F3 (save).**

EXAMINER NOTE: When the gland sealing steam PCV bypass is controlling gland steam pressure, proceed to the next event.

Proceed to the next event at the discretion of the Lead Examiner.

Op-Test No.: **2016-1** Scenario No.: **5** Event No.: **5**

Event Description: **EH Oil Pump trips with failure of the standby pump to auto start.**

Time	Position	Applicant's Actions or Behavior
	CRS	Reference 1203.012D, ACA for K05-C7 for EH PUMP P14A/B TRIP and K05-B7 for EH OIL PRESS HI/LO.
	FYI	Instruction per K05-B7 starting at Step 2
	BOP	2. IF EH pressure low, THEN perform the following:
		NOTE When the EH Oil system is in-service, the pressure should be >1500 psig even when the turbine is tripped.
	BOP N/A N/A	A. Manually start the standby EH Oil Pump (P-14A or P-14B) or verify auto start at 1400 psig. B. IF EH pressure low AND holding constant, THEN immediately initiate steps to determine cause of low pressure. C. Adjust EH Pump compensator adjustment to establish 1850 to 1900 psig.
		Instruction per K05-C7
	N/A	1. IF EH Fluid Lockout Relay (286/LFT) is tripped, … N/A
	BOP	2. IF 286/LFT is not tripped, THEN either manually start standby EH Oil Pump (P-14A or P-14B) OR verify auto start at ≤ 1400 psig. B. IF P-14B is tripped, THEN go to P-14B breaker (B-4225). 1. Reset per "Reclosing Individual Load Supply Breakers" section of 1107.001. C. Place handswitch for tripped pump in normal-after-stop or PULL-TO-LOCK.
	CREW	3. Initiate steps to determine cause of trip.
BOOTH		Report that there is no obvious problem at the pump, but the breaker thermals are tripped.
		Proceed to the next event at Lead Examiner discretion.

Op-Test No.: **2016-1** Scenario No.: **5** Event No.: **6**

Event Description: **A STEAM GENERATOR Tube Leak requiring shutdown.**

Time	Position	Applicant's Actions or Behavior
	CRS	Reference 1203.012F, ACA for K07-A5 for A OTSG N-16 TROUBLE
EXAMINER NOTE: The ACA is written for small slow developing tube leaks, the CRS may elect to go directly to the AOP. The following steps are from the ACA.		
	BOP	1. Observe RI-2691 to determine alarm mode.
	BOP	2. IF the reactor is critical with RI-2691 in Alert or High alarm, OR alarm is suspected to be a spike, THEN verify Gross/Analyzer switch in the Analyzer (left) position, located inside the drawer on the right side, second card from the front. (Rate meter will now show N16 gamma only.)
	CRS	3. IF OTSG tube leak is indicated by rising N-16 levels, THEN perform the following: A. Direct Chemistry to sample secondary system for activity
	CREW	B. Determine primary system leak rate.
	CRS	4. IF OTSG tube leak validated by any of the following - Chemistry Sample - Main Condenser Radiation Process Monitor (RI-3632) rising - RCS leak rate is rising as indicated by Makeup Tank (T-4) level dropping THEN GO TO Small Tube Leak Procedure (1203.023):
	CRS	Reference 1203.023, Small Tube Leak Section 1, SG-A Tube Leak
		NOTE • Due to lower flow rates and pressure differentials, leak rates at low power (<20%) may not be accurately represented when using either N-16 Radiation Monitoring System. • The MGP N-16 Radiation Monitoring System can detect leaks up to 156 gpm.
	CREW	**1. Determine Primary to Secondary leak rate using Attachment 1.**

Op-Test No.: **2016-1** Scenario No.: **5** Event No.: **6** Event Description: **A STEAM GENERATOR Tube Leak requiring shutdown.**		
Time	**Position**	**Applicant's Actions or Behavior**
	CRS	**2. Notify Chemistry personnel to perform Primary to Secondary Leakage (1602.001) without delay. (Reference TR 3.7.7.1)**
		NOTE It is necessary to continue to monitor for changes in leak rates and leak rate rate-of-change to determine if additional actions are required to be performed for higher leak rates.
	CRS	**3. WHEN Primary to Secondary leak rate has been determined,** **THEN GO TO the applicable step per the table below:**
EXAMINER NOTE: Based on the table the CRS should go to Step 4. Final leak rate for this event is ~3 gpm.		
		NOTE To avoid an unnecessary plant shutdown, tube leaks >75 gpd should be qualitatively confirmed prior to declaration. Leakage is qualitatively confirmed when two independent radiation monitors trend in the same direction with the same order of magnitude. If only one radiation monitor is functional, then shutdown shall be based on the indication of the one monitor.
	CRS	**4. IF total SG tube leakage (both SGs) is ≥1 gpm (1,440 gpd), THEN perform the following:** A. **IF** turbine trips, **THEN** immediately trip the reactor **AND GO TO** Tube Rupture (1202.006). B. **IF** reactor trips, **THEN GO TO** Tube Rupture (1202.006).
	ATC	**5. Reduce reactor power to <50% within 1 hour at ≥1.0%/minute per Rapid Plant Shutdown (1203.045).** • Place unit in Mode 3 within the next 2 hours by continuing shutdown at ≥0.5%/minute per Rapid Plant Shutdown (1203.045). • **GO TO** step 10 while continuing with plant shutdown and cooldown.

ATTACHMENT 1
PRIMARY TO SECONDARY LEAK RATE ESTIMATION

1.0 Estimate primary to secondary leakrate using one or more of the following:

- Use the following formula to perform mass balance estimate for leak rates >5 gpm.

(_____)	+	(________)	–	(_____)	–	(________)	=	(______)
Makeup		Seal Injection		Letdown		Seal Bleedoff		Leak Rate

- **IF** the reactor is critical,
  THEN use PMS indications for SG Leak Rate and Rate of Change.

SG-A	SG-B
N-16 AVG Leakrate GPM (SGALRGPM) (________)	N-16 AVG Leakrate GPM (SGBLRGPM) (________)
N-16 AVG Leakrate GPD (SGALRGPD) (________)	N-16 AVG Leakrate GPD (SGBLRGPD) (________)
N-16 Leakrate ROC GPM/HR (SGAROC1) (________)	N-16 Leakrate ROC GPM/HR (SGBROC1) (________)
N-16 Leakrate ROC GPD/HR (SGAROC2) (________)	N-16 Leakrate ROC GPD/HR (SGBROC2) (________)

NOTE

- N-16 detectors RI-2691 and RI-2692 have a GROSS/ANALYZER switch located inside the drawer on the right side, second card from the front.
- The correlation between cpm and gpd in the table below is based on 100% Rx power N-16 production and steam flow. The same countrate at <100% is indicative of a larger leak.

- **IF** the reactor is critical,
  THEN place the applicable OTSG N-16 Detector in ANALYZER mode and estimate leak rate.
  - A OTSG N-16 Detector (RI-2691)
  - B OTSG N-16 Detector (RI-2692)

IF OTSG N-16 Detector reading in ANALYZER mode is:	**THEN** SG Tube Leak Rate is:
$\geq 2 \times 10^3$ cpm	≥30 gpd
$\geq 5 \times 10^3$ cpm	≥75 gpd
$\geq 1 \times 10^4$ cpm	≥150 gpd

- Perform RCS Leak Detection (1103.013).

Op-Test No.: **2016-1** Scenario No.: **5** Event No.: **6**

Event Description: **A STEAM GENERATOR Tube Leak requiring shutdown.**

Time	Position	Applicant's Actions or Behavior
	BOP	**10. Perform Control of Secondary System Contamination (1203.014).**
		NOTE Only the MGP N-16 Radiation Monitoring System is qualified to meet the minimum requirements specified by EPRI Guidelines.
	N/A	**11. IF the MGP N-16 Radiation Monitoring System is or becomes unavailable to SG-A, THEN perform Attachment 2, "No Operable Continuous Radiation Monitor" section.**
	BOP	**12. Raise monitoring of radiation monitors to once every 15 minutes using Attachment 3.**
		NOTE Steam Line High Range Radiation Monitors (RI-2682 and RI-2681) readings may be inconclusive due to inadequate shielding.
	CREW	**13. Unless already determined, determine affected SG using one or more of the following:**
	ATC CRS	**14. IF shutdown is required, THEN place SG-A EFW Pump Turbine (K3) Steam Supply (CV-2667) valve in MANUAL AND close:** A. Refer to TS 3.7.5 Condition A.

EXAMINER NOTE: The T.S. for the tube leak is T.S. 3.4.13 Condition B. The EFW T.S. 3.7.5 Condition A, will be entered when CV-2617 is closed. That may occur here or later in the Tube Rupture EOP. Once the proper T.S. entries occur, proceed at the discretion of the Lead Examiner.

Op-Test No.: **2016-1** Scenario No.: **5** Event No.: **7**

Event Description: **A Steam Generator Tube Rupture.**

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE: Per the table in Step 3 of the Tube Leak AOP, when STEAM GENERATOR leakage is >10 gpm, the crew should transition to the Tube Rupture EOP. Final leak rate is ~150 gpm.		
	CRS	**1. IF reactor or turbine has tripped OR trips during plant runback OR PZR level drops below 100" during plant runback, THEN perform the following:** A. Direct Control Board Operators to monitor Floating Steps. B. **GO TO step 11**. •
	CRS	**2. Perform the following:** A. Direct Control Board Operators to monitor Floating Steps. B. Advise Shift Manager to perform BOTH of the following: • Notify Nuclear Chemistry to begin off-site dose projections. • Implement Emergency Action Level Classification (1903.010).
	BOP	**3. Open BWST T3 Outlet (CV-1407 or CV-1408) to operating HPI pump.**
	ATC	**4. Perform the following:** A. **IF** SGs are above LOW LEVEL LIMIT, **THEN** verify Pressurizer Level Control (CV-1235) maintains PZR level ≥ 200". B. **IF** SGs are at LOW LEVEL LIMIT, **THEN** verify Pressurizer Level Control (CV-1235) maintains PZR level > 100".
	ATC	5. IF Reactor power is > 20%, THEN begin controlled plant shutdown at ≥ 5**%** per minute.

Op-Test No.: **2016-1** Scenario No.: **5** Event No.: **7**		
Event Description: **A STEAM GENERATOR Tube Rupture.**		

Time	Position	Applicant's Actions or Behavior
	CREW	**6. Determine bad SG using one or more of the following:** • **OTSG N-16 Gross Detectors:** **SG A RI-2691 / SG B RI-2692** • **SGTR display on SPDS** • **Plant Monitoring System Alarms** • **Steam Line High Range Radiation Monitors:** **SG A RI-2682 / SG B RI-2681** • **Local steam line radiation survey** • **Nuclear Chemistry sample** • **At low FW flow rates:** – **Higher than expected SG level** – **Lower than expected FW flow rate** – **Lower than expected MFW pump speed**
	CRS	7. Verify Control of Secondary System Contamination (1203.014) being performed in conjunction with this procedure.
	ATC	**8. <u>WHEN</u> bad SG is known, <u>THEN</u> place bad SG EFW Pump Turbine K3 Steam Supply valve in MANUAL <u>AND</u> close:** **SG A** **CV-2667**
	BOP	**9. Perform the following during power reduction (Refer to Power Reduction and Plant Shutdown (1102.016) if needed):** B. At ≤ 50%, transfer plant auxiliaries to SU1 per Electrical System Operations (1107.001). (See Attachment 1 to this guide)

Op-Test No.: **2016-1** Scenario No.: **5** Event No.: **7**

Event Description: **A Steam Generator Tube Rupture.**

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE: Per the table in Step 3 of the Tube Leak AOP, when STEAM GENERATOR leakage is >10 gpm, the crew should transition to the Tube Rupture EOP.		
	N/A	C. **WHEN** Main Generator output ≤ 350 MW … N/A
	ATC	D. Set Lo-Load Limit at minimum.
	ATC	E. Verify HP Turbine Drains open on C02.
	BOP	F. Verify Gland Sealing Steam Spillover Regulator Bypass (CV-6640) closed.
		NOTE When both SGs are on LO LEVEL LIMIT, further power reduction will result in lowering Tave and pressurizer level. Slowing down the rate of power change can help achieve more precise control of RCS inventory.
	ATC	G. **WHEN** both SGs are on LO LEVEL LIMIT (20 to 40"), **THEN** perform the following: 1) Place Feedwater Demand H/A stations in HAND **AND** adjust demand to zero: • Feedwater Demand Loop A • Feedwater Demand Loop B 2) Place Reactor Demand H/A station in HAND **AND** adjust as necessary to control reactor power below 20%.
	BOP	**10. WHEN reactor power is below 20%, THEN perform the following:** A. Verify plant auxiliaries aligned to SU1. B. IF Main Turbine is in service, THEN place in TURBINE MANUAL. C. Adjust Header Pressure Controlling setpoint to 45.
	ATC	**11. Depress Reactor Trip PB.** A. Verify all rods inserted **AND** reactor power dropping.
BOOTH: Insert Vacuum leak when the reactor is tripped and adjust as necessary to cause the low condenser vacuum interlock closure of the TBVs after a cooldown is commenced.		

Op-Test No.: **2016-1** Scenario No.: **5** Event No.: **7**		
Event Description: **A STEAM GENERATOR Tube Rupture.**		
Time	**Position**	**Applicant's Actions or Behavior**
	ATC Critical Task	A. Perform the following: 1) **IF** Reactor fails to trip, … N/A 2) **IF** more than one rod fails to fully insert **OR** reactor power is **not** dropping, **THEN** perform Emergency Boration (RT-12). 3) Do **not** continue until Reactor is shutdown.
EXAMINER NOTE: ***CRITICAL TASK***The two stuck rods represent Event 8 and the performance of RT-12 is a Critical Task. RT-12 is located at the end of this exam guide and must be initiated within 15 minutes of the reactor trip. Record time of reactor trip.		
	BOP	**12. Verify Turbine tripped.** A. Check Turbine throttle and governor valves closed.
	BOP	**13. Check adequate SCM.**
	BOP	**14. Verify Header Pressure Controlling setpoint adjusted to 45.** A. Check TURB BYP Valves controlling SG press 950 to 990 psig in AUTO **OR** < 990 psig with TURB BYP Valves in HAND. B. Check MSSV OPEN (K07-C5) alarm clear.
	CRS	**15. Verify Shift Manager advised to perform BOTH of the following:** • **Notify Nuclear Chemistry to begin off-site dose projections.** • **Implement Emergency Action Level Classification (1903.010).**

Op-Test No.: **2016-1** Scenario No.: **5** Event No.: **7**

Event Description: **A STEAM GENERATOR Tube Rupture.**

Time	Position	Applicant's Actions or Behavior
	ATC	**16. Verify Orifice Bypass (CV-1223) closed.**
	BOP	**17. Verify BWST T3 Outlet (CV-1407 or CV-1408) to operating HPI pump open.**
	N/A	**18. <u>IF</u> only DG power is available, <u>THEN</u> GO TO 1202.007, "DEGRADED POWER" procedure unless entry was from that procedure.**
	BOP	**19. Check Main Generator and Exciter Field breakers open:** • **5114** • **5118** • **Exciter Field breaker**
		<u>NOTE</u> PZR cooldown rate limits do not apply during SGTR.
	ATC	**20. Operate Pressurizer Heaters <u>AND</u> Pressurizer Spray valve (CV-1008) to maintain RCS press low within limits of Figure 3 (RT-14).** A. **<u>IF</u>** RCS press drops below 1700 psig **<u>AND</u>** SCM is adequate **<u>AND</u>** RCS press is controlled, **<u>THEN</u>** bypass ESAS.
	BOP	**21. Stabilize PZR level ≥ 55" as follows:** A. **<u>IF</u>** Emergency Boration is **<u>not</u>** in progress, **<u>THEN</u>** adjust Pressurizer Level Control setpoint to 100". B. **<u>IF</u>** HPI is in service, **<u>THEN</u>** adjust HPI flow as necessary to maintain PZR level ≥ 55" **<u>AND</u>** RCS press low within limits of Figure 3 (RT-14). C. **<u>IF</u>** PZR level is < 55", **<u>OR</u>** if PZR level is predicted to drop below 55", **<u>THEN</u>** initiate HPI (RT-2).

Op-Test No.: **2016-1** Scenario No.: **5** Event No.: **7**

Event Description: **A STEAM GENERATOR Tube Rupture.**

Time	Position	Applicant's Actions or Behavior
	BOP	**22. Verify OTSG N-16 Gross Detectors selected to GROSS:** • **RI-2691** • **RI-2692**
	CREW	**23. Verify bad SG determined using one or more of the following:**
EXAMINER NOTE: The bad SG was previously determined, so the bulleted guidance has not been included here.		
	CRS	**24. Verify Control of Secondary System Contamination (1203.014) being performed in conjunction with this procedure.**
	ATC	**25. Verify bad SG EFW Pump Turbine K3 Steam Supply valve in MANUAL AND closed:** **SG A** CV-2667
	N/A	**26. IF bad SG level is approaching 410"** … N/A
EXAMINER NOTE: Emergency Cooldown rates are not applicable for the given scenario.		
	ATC	**27. IF emergency cooldown rate is not required** **OR** **RCS T-hot is ≤ 500°F,** **THEN establish RCS cooldown rate of ≤ 100°F/hr as follows:** A. For good SG, place TURB BYP Valves in HAND **AND** adjust to maintain cooldown rate ≤ 100°F/hr.
EXAMINER NOTE: ***CRITICAL TASK*** Commencing the cooldown is one of the Critical Tasks, an RCS cooldown must be commenced prior to the ruptured STEAM GENERATOR reaching 400 inches. A loss of condenser vacuum is in progress and will require transition to the ADVs for the cooldown to continue.		
	ATC	B. **IF** RCS press drops below 1700 psig **AND** SCM is adequate **AND** RCS press is controlled, **THEN** bypass ESAS. C. **IF** only one SG is bad, **THEN** steam **bad** SG only as necessary to maintain Exhibit 1 limits.
Proceed to the next event when TBV interlock closed.		

Op-Test No.: **2016-1** Scenario No.: **5** Event No.: **7**		
Event Description: **A STEAM GENERATOR Tube Rupture.**		
Time	**Position**	**Applicant's Actions or Behavior**
	BOP	**28. Perform the following to place AUX Feedwater Pump (P75) in service:** A. Dispatch an operator to open AUX FW Pump RECIRC to E-11A Isolation (FW-1). B. Verify Feedwater Pumps Discharge Crosstie (CV-2827) open. C. **<u>WHEN</u>** FW-1 is open, **<u>THEN</u>** start P75.
	ATC	**29. <u>IF</u> MFW pump(s) operating, <u>THEN</u> perform the following:** A. Place operating MFW Pump H/A station(s) in HAND **<u>AND</u>** adjust demand to zero: • MFW Pump Loop A • MFW Pump Loop B 1) Check P75 maintains $\geq$ 70 psid across Startup valves. 2) Check good SG Startup valve maintains SG level 20 to 40". 3) Check **bad** SG Startup valve maintains SG level 20 to 40" **<u>OR</u>** closed if SG level > 40". B. Trip Main Feed Pump(s).

Op-Test No.: **2016-1** Scenario No.: **5** Event No.: **9** Event Description: **TBVs Close due to loss of vacuum.**		
Time	**Position**	**Applicant's Actions or Behavior**
EXAMINER NOTE: The following step is the contingency action for Step 27, which establishes the cooldown. ***CRITICAL TASK*** An RCS cooldown must be commenced prior to the ruptured STEAM GENERATOR reaching 400 inches.		
	ATC Critical Task	A. **IF** TURB BYP Valves are **not** available, **THEN** operate ATM Dump Control System for good SG in HAND to maintain cooldown rate ≤ 100°F/hr. 1) **IF** both SGs are bad, **THEN** steam both SGs.
EXAMINER NOTE: Once the cooldown is re-established with ADVs, the scenario is completed.		
FREEZE AT LEAD EXAMINERS DISCRETION		

SG A		**SG B**
CV-2376	ATM DUMP ISOL	CV-2619
CV-2668	ATM DUMP CNTRL	CV-2618

SUPPORTING DOCUMENTATION FOR CRITICAL TASKS

ANO-1 has developed a document that utilizes technical basis documents and input from Operations Management to define acceptable performance for critical tasks. The following pages come from that document.

At the end of each critical task page, is the applicable criteria discussion pertaining to 2016-1 exam.

CT-23 Establish and Maintain Reactor Shutdown Requirements

CT based on: Reactivity control to provide adequate shutdown margin

TBD Description

When reactor trip occurs or should occur, the operator must initiate rod insertion signals and maintain decreasing reactor power. If more than one rod remains stuck out, the operator should begin boration to increase the shutdown margin.

During cooldown, due to Excessive Heat Transfer or SGTR, shutdown margin must be maintained by adding boron to the RCS as necessary.

TBD Conditions

Reactor trip is required and during cooldown due to Excessive Heat Transfer or SGTR mitigation.

Associated GEOG Bases:

When a reactor trip occurs or should occur, the operator must initiate rod insertion signals and maintain decreasing reactor power. If more than one rod remains stuck out, the operator should begin boration to increase the shutdown margin.

During cooldown, due to EHT or cooldown to DHR during SGTR mitigation, shutdown margin must be maintained by adding boron to the RCS as necessary.

Certain transient conditions can result in localized boron dilution in the RCS. A restart of an RCP with sufficient localized deboration could result in a return to criticality. These conditions can develop whenever RCS voids exist.

ANO Version(s)

(1) Emergency Boration should be directed and started within 15 minutes of the reactor trip.
(2) The manual trip should occur before the ERV opens or the Pressurizer exceeds 290 inches.
(3) The reactor should be tripped before one train of HPI is fully in service (four HPI nozzles full open).
(4) The reactor should be tripped within two minutes after any crew member identifies a second dropped rod.
(5) Emergency boration should be restarted within 15 minutes after the Operating HPI pump trips.
(6) The reactor should be manually tripped before PZR level reaches 100 inches.
(7) Reactor shall be tripped within five minutes of the sheared shaft malfunction becoming active.

SES used

Justification for ANO:

(1) Per the Unit 1 TS Bases, 15 minutes provides an adequate time for an operator to correctly align and start the required systems and components necessary to ensure that adequate SDM exists in Modes 3, 4, and 5.

(2) With RPS failed and no automatic actions to trip the reactor on a closed MSIV, operator action is required to place the plant in a safe, analyzed condition. Accomplishing this task prior to the ERV lift setpoint (> RPS High Pressure trip) and High Pzr level requiring manual trip, provides adequate time for the crew to diagnose the unanalyzed condition (reactor critical with closed MSIV) and trip the reactor. Due to the degraded heat sink, RCS pressure and Pzr level will be quickly rising providing indications to the crew that this event has occurred.

(3) Tripping the reactor before a full train of HPI is in service provides a reasonable time for the crew to diagnose the need to initiate HPI to make up for RCS inventory loss and to trip the reactor appropriately.

(4) 2 minutes provides a reasonable time for the crew to diagnose the condition of 2 dropped control rods and to trip the reactor as required.

(5) Same justification in (1) above.

(6) A large LOCA is in progress for this scenario. 100” Pzr level as a criterion provides adequate time for the crew to determine that RCS makeup capacity is exceeded and to trip the plant prior to reaching the 100” Rx Trip EOP requirement.

(7) 5 minutes provides a reasonable time for the crew to diagnose the sheared shaft condition and implement the proper actions IAW appropriate procedural guidance to protect the core from a reduced flow condition.

For the 2016-1 ILO NRC Exam criterion (1) is applicable. The initiation of emergency boration must occur within 15 minutes of the reactor trip.

CT-7 **Minimize SCM**

CT based on: Add/Maintain appropriate RCS water mass
CT based on: Maintaining acceptable limits of radiation releases due to SGTR induced RB bypass

TBD Description
Maintain RCS pressure close to but above minimum allowable SCM and, if applicable, the RCP NPSH limit.

TBD Conditions
SGTR mitigation when SCM is greater than the minimum allowable.

Associated GEOG Bases:

Except when RCP NPSH limits are applicable and are more restrictive, RCS pressure should be maintained close to, but above, the minimum SCM to minimize RCS-SG ΔP. The reason for minimizing RCS-SG ΔP is to reduce the leak flowrate from primary to secondary to as low as possible. Therefore, this procedure (minimizing SCM) is desirable whenever possible during SGTR mitigation.

Reducing the leak flowrate from the RCS to the secondary side of a SG reduces RCS losses and when accomplished with an impaired steam system (e.g., weeping MSSV and MSL leak) should reduce integrated radiation releases from the impaired system. If the level of the leaking SG can be maintained within normal operating limits, then the SG will remain available for continued use during the cooldown, thus enhancing the transient mitigation capability of the plant.

ANO Version(s)
The PZR cooldown/RCS cooldown should be commenced before the 'X' SG reaches 400 inches based upon limiting the off-site release and the need for future steaming of the bad SG. The PZR cooldown should be commenced by minimizing SCM IAW RT-14 (Pzr Spray Valve full open and all pzr heaters off).

ANO Basis
Commencing a PZR cooldown and RCS cooldown on a tube rupture is critical to minimize the leak flow rate and minimize the duration of the transient before the leak flow is terminated.

SES used

Justification for ANO
Commencing the Pressurizer and RCS Cooldown is critical to lower the RCS to OTSG D/P, which reduces the RCS leak rate, sometimes by as much as a factor of 2. Accomplishing this action before the affected (bad) SG reached 400" provides 2 functions:

Prevents challenging the 410” criteria which would result in the need to perform an Emergency C/D or HPI cooldown (if the other SG is affected) to reduce the SG pressure below the MSSV safety valve setpoint to facilitate isolation of the affected SG. The Emergency C/D can challenge operator control of the plant, while the HPI cooldown can challenge the MSSV safety valve setpoint, resulting in an unnecessary steam release.

1. Prevents the need to isolate the affected SG until procedurally directed. This maintains the bad SG available should subsequent issues occur in the other SG.
2. Prevents the need to isolate the affected SG until procedurally directed. This maintains the bad SG available should subsequent issues occur in the other SG.

For the 2016-1 ILO NRC Exam criteria, an RCS cooldown must be commenced prior to the ruptured STEAM GENERATOR reaching 400 inches which could result in increased exposure to the public.

INITIATE HPI

1. **IF HPI initiation is for any reason other than Emergency Boration (RT-12), THEN isolate Letdown by closing either:**

- Letdown Coolers Outlet (RCS) (CV-1221)

  OR

- Letdown Coolers Outlets (RCS):
  - CV-1214
  - CV-1216

2. **IF OP or STBY HPI pump is running, THEN perform the following:**

A. Verify BWST T3 Outlet to OP or STBY HPI pump (CV-1407 or CV-1408) open.

B. **IF** RCP Seal Injection is in service,
THEN place RCP Seal INJ Block (CV-1206) in OVRD.

C. **WHEN** associated BWST T3 Outlet is open,
THEN open HPI Block valve associated with OP or STBY HPI pump (CV-1220 or CV-1285) to maintain PZR level and RCS press.

D. **IF** initiating HPI for Emergency Boration only,
THEN GO TO RT-12 step 2.B.

E. **IF** PZR level or RCS press continues to drop,
THEN open additional HPI Block valves associated with OP or STBY HPI pump:

P36A/B	P36B/C
CV-1219 CV-1278 CV-1279	CV-1227 CV-1228 CV-1284

INITIATE HPI

3. **<u>IF</u> either OP or STBY HPI pumps are available**
<u>AND</u> both pumps are off,
<u>THEN</u> place OP or STBY HPI pump in service as follows:

A. Verify BWST T3 Outlet to OP and STBY HPI pump (CV-1407 or CV-1408) open.

B. Verify RCP Seal INJ Block (CV-1206) closed.

C. Close RCS Makeup Block (CV-1233 or CV-1234).

D. Prevent dead heading pump by verifying one of the following:

- Both HPI Pump RECIRC Blocks open:
  - CV-1300
  - CV-1301

  <u>OR</u>

- One HPI Block valve associated with OP HPI pump (CV-1220 or CV-1285) fully open.

E. **<u>IF</u>** HPI Pump (P-36B) will be used,
<u>THEN</u> verify the following selected to energized bus:

- P36B/P64B Bus Select MOD Control
- P64B Transfer Switch

F. Start AUX Lube Oil pump for OP or STBY HPI pump.

G. Start OP or STBY HPI pump.

H. Stop AUX Lube Oil pump.

(3. CONTINUED ON NEXT PAGE)

INITIATE HPI

3. (Continued)

I. **<u>WHEN</u>** associated BWST T3 Outlet is open,
<u>THEN</u> open HPI Block valve associated with OP or STBY HPI pump (CV-1220 or CV-1285) to maintain PZR level and RCS press.

1) **<u>IF</u>** PZR level or RCS press continues to drop,
<u>THEN</u> open additional HPI Block valves associated with OP or STBY HPI pump:

P36A/B	P36B/C
CV-1219 CV-1278 CV-1279	CV-1227 CV-1228 CV-1284

2) Monitor Makeup Tank level and control per step 10 as necessary.

J. **<u>IF</u>** initiating HPI for Emergency Boration only,
<u>THEN</u> GO TO RT-12 step 2.B.

4. <u>IF</u> PZR level or RCS press continues to drop,
<u>THEN</u> place ES HPI pump in service as follows:

A. Open BWST T3 Outlet to ES HPI pump (CV-1407 or CV-1408).

B. Prevent dead heading pump by verifying one of the following:

- Both HPI Pump RECIRC Blocks open:
  - CV-1300
  - CV-1301

  <u>OR</u>

- One HPI Block valve associated with ES HPI pump (CV-1220 or CV-1285) fully open.

C. Start AUX Lube Oil pump for ES HPI pump.

D. **<u>IF</u>** OP and STBY pumps are both off,
<u>THEN</u> verify RCP Seal INJ Block (CV-1206) closed.

(4. CONTINUED ON NEXT PAGE)

INITIATE HPI

4. (Continued)

E. **<u>WHEN</u>** associated BWST T3 Outlet is open,
<u>THEN</u> start ES HPI pump.

F. Stop AUX Lube Oil pump.

G. Open HPI Block valve associated with ES HPI pump (CV-1220 or CV-1285) to maintain PZR level and RCS press.

1) **<u>IF</u>** initiating HPI for Emergency Boration only,
<u>THEN</u> GO TO RT-12 step 2.B.

2) **<u>IF</u>** PZR level or RCS press continues to drop,
<u>THEN</u> open additional HPI Block valves associated with ES HPI pump:

P36A	P36C
CV-1219 CV-1278 CV-1279	CV-1227 CV-1228 CV-1284

3) Monitor Makeup Tank level and control per step 10 as necessary.

5. <u>IF</u> all HPI Block valves are fully open
<u>AND</u>
additional HPI flow is required,
<u>THEN</u> close HPI Pump RECIRC Block (CV-1300 or CV-1301).

6. <u>IF</u> only one train of HPI is available
<u>AND</u>
RCS press is > 600 psig,
<u>THEN</u> throttle HPI Block valve with the highest flow to within 20 gpm of the next highest flow.

INITIATE HPI

7. <u>IF</u> leakage into the RB is indicated,
<u>THEN</u> maximize RB cooling as follows:

A. Verify all four RB Cooling Fans running:

- VSF1A
- VSF1C
- VSF1B
- VSF1D

B. Open RB Cooling Coils Service Water Inlet/Outlet valves:

- CV-3812/CV-3814
- CV-3813/CV-3815

C. Unlatch key-locked Chiller Bypass Dampers:

- SV-7410
- SV-7412
- SV-7411
- SV-7413

8. Verify the following sample valves closed on C26:

- Pressurizer Steam Space Sample Valve (CV-1814)
- Pressurizer Water Space Sample Valve (CV-1816)
- Hot Leg Sample (SV-1840)

9. Verify the following High Point Vents closed,
<u>except</u> when another procedure directs otherwise:

A Loop	B Loop	Reactor Vessel	Pressurizer
• SV-1081	• SV-1091	• SV-1071	
• SV-1082	• SV-1092	• SV-1072	• SV-1077
• SV-1083	• SV-1093	• SV-1073	• SV-1079
• SV-1084	• SV-1094	• SV-1074	

INITIATE HPI

10. **<u>IF</u> Makeup Tank level is rising**
<u>AND</u>
it is necessary to control Makeup Tank level,
<u>THEN</u> perform one or more of the following:

- Verify all running HPI pump flow(s) ≥ 90 gpm/pump
  <u>AND</u>
  close HPI Pump RECIRC Block (CV-1300 or CV-1301).

  1) Maintain running HPI pump flow ≥ 90 gpm/pump.

- **<u>IF</u>** OP and STBY HPI pumps are both off,
  <u>THEN</u> start OP or STBY pump per step 3.

- **<u>IF</u>** OP or STBY HPI pump is running,
  <u>THEN</u> perform the following:

  1) Verify HPI Pump RECIRC Blocks open:

     - CV-1300

     - CV-1301

  2) Transfer HPI flow from ES pump to OP or STBY pump as necessary to control Makeup Tank level.

  3) **<u>IF</u>** total HPI flow is within capacity of OP or STBY HPI pump,
     <u>THEN</u> perform the following:

     a) Transfer remaining HPI flow to OP or STBY HPI pump.

     b) Start AUX Lube Oil pump for ES HPI pump.

     c) Stop ES HPI pump.

     d) Stop AUX Lube Oil pump.

END

RT-14

CONTROL RCS PRESS

NOTE

- PTS limits apply if any of the following has occurred:
  - HPI on with all RCPs off
  - RCS C/D rate > 100°F/hr with Tcold < 355°F
  - RCS C/D rate > 50°F/hr with Tcold < 300°F
- Once invoked, PTS limits apply until an evaluation is performed to allow normal press control.
- When PTS limits are invoked OR SGTR is in progress, PZR cooldown rate limits do not apply.
- PZR cooldown rate <100°F/hr.

1. IF PTS limits apply or RCS leak exists,
THEN maintain RCS press low within limits of Figure 3.

2. IF RCS press is controlled AND will be reduced below 1650 psig,
THEN bypass ESAS as RCS press drops below 1700 psig.

3. IF PZR steam space leak exists,
THEN limit RCS press as PZR goes solid by one or more of the following:

A. Throttle makeup flow.

B. **IF** SCM is adequate,
THEN throttle HPI flow by performing the following:

1) Verify both HPI Recirc Blocks open:

- CV-1300
- CV-1301

2) Throttle HPI.

C. Raise Letdown flow.

1) **IF** ESAS has actuated,
THEN unless fuel damage or RCS to ICW leak is suspected, restore Letdown per RT-13.

D. Verify Electromatic Relief ERV Isolation open (CV-1000)
AND cycle Electromatic Relief ERV (PSV-1000).

CONTROL RCS PRESS

4. <u>IF</u> RCS press is high,
<u>THEN</u> limit press using one or more of the following:

A. Throttle makeup flow.

B. Throttle HPI flow by performing the following:

1) Check adequate SCM **<u>AND</u>** any of the following conditions met:

- HPI Cooling (RT-4) **<u>not</u>** in progress
- CET temps dropping
- RCS press rising with Electromatic Relief ERV (PSV-1000) open

2) Verify both HPI Recirc Blocks open:

- CV-1300
- CV-1301

3) Throttle HPI.

C. **<u>IF</u>** RCP is running,
<u>THEN</u> operate Pressurizer Spray Control (CV-1008) in HAND.

D. **<u>IF</u>** PZR AUX Spray is in service,
<u>THEN</u> throttle Pressurizer AUX Spray (CV-1416) open.

E. Place Pressurizer Heaters in OFF.

F. Raise Letdown flow.

1) **<u>IF</u>** ESAS has actuated,
<u>THEN</u> unless fuel damage or RCS to ICW leak is suspected restore Letdown per RT-13.

G. Verify Electromatic Relief ERV Isolation open (CV-1000)
<u>AND</u> cycle Electromatic Relief ERV (PSV-1000).

(4. CONTINUED ON NEXT PAGE)

CONTROL RCS PRESS

4. (Continued)

H. **<u>IF</u>** desired to secure HPI pump(s),
<u>THEN</u> perform the following:

1) Start AUX Lube Oil pumps for associated HPI pump(s):

P36A	**P36B**	**P36C**
P64A	P64B	P64C

2) Stop desired HPI pump(s):

- P36A
- P36B
- P36C

3) Close all associated HPI Block valves:

P36A/B	**P36B/C**
• CV-1219	• CV-1227
• CV-1220	• CV-1228
• CV-1278	• CV-1284
• CV-1279	• CV-1285

5. <u>IF</u> RCS press is low,
<u>THEN</u> raise press using one or more of the following:

A. Raise makeup flow.

B. Raise HPI flow or initiate HPI per RT-2.

C. **<u>IF</u>** RCP is running,
<u>THEN</u> verify Pressurizer Spray Control (CV-1008) closed.

D. Reduce Letdown flow.

E. Place Pressurizer Heaters in MANUAL.

(5. CONTINUED ON NEXT PAGE)

CONTROL RCS PRESS

5. (CONTINUED)

<u>CAUTION</u>
If HPI cooling is in progress, Electromatic Relief ERV Isolation (CV-1000) must be left open until HPI cooling is no longer required.

F. Verify Electromatic Relief ERV (PSV-1000) or Electromatic Relief ERV Isolation (CV-1000) closed.

<u>CAUTION</u>
With RCS solid, 1°F temp change can cause 100 psig press change.

6. <u>IF</u> PZR is solid,
<u>THEN</u> RCS press may also be controlled by varying RCS temperature.

- Raise RCS temp to raise RCS press
- Lower RCS temp to lower RCS press

<u>NOTE</u>
Adjusting Pressurizer Level Control setpoint and HPI as necessary to maintain normal makeup flow on-scale will allow CV-1235 to automatically compensate for small changes in RCS leak rate and cooldown rate.

7. <u>IF</u> normal makeup is in service
<u>AND</u>
HPI is in service,
<u>THEN</u> adjust Pressurizer Level Control setpoint and HPI as necessary to maintain normal makeup flow on-scale.

END

EMERGENCY BORATION

NOTE
If an unexpected delay occurs in implementation of Step 1, then promptly initiate Emergency Boration using HPI per step 2.

1. IF Boric Acid pump (P39A or P39B) and Batch Controller are available, THEN perform the following:

A. **IF** both OP and STBY HPI Pumps are off
OR
Letdown is isolated,
THEN GO TO step 2.

B. Set Batch Controller for maximum batch size as follows:

1) Depress lower DISPLAY.

2) Depress TOTAL.

3) Depress TOTAL RESET.

4) Depress BATCH SET.

5) Depress 9, six times.

6) Depress ENTER.

7) Depress lower DISPLAY.

C. Verify Condensate to Batch Controller (CV-1251) closed.

D. Open Batch Controller Outlet (CV-1250).

E. Verify both Makeup Filters in service:

- F3A
- F3B

F. Record initial BAAT (T-6) level ____________ in.

G. Start available Boric Acid pump(s) (P39A or P39B or both).

(1. CONTINUED ON NEXT PAGE)

EMERGENCY BORATION

1. (Continued)

H. Start Batch Controller by depressing RUN key.

I. Adjust Batch Controller Flow CNTRL VLV (CV-1249) to 100% open as follows:

1) Depress VALVE SET.

2) Depress numbers: 1, 0, 0.

3) Depress ENTER.

4) Depress lower DISPLAY.

5) Depress RATE.

J. **IF** Batch Controller output rate < 5 gpm,
THEN perform the following:

1) Stop running Boric Acid pump(s):

- P39A
- P39B

2) Close Batch Controller Outlet (CV-1250).

3) Stop Batch Controller by depressing STOP key.

4) **GO TO step 2.**

K. Adjust Pressurizer Level Control Setpoint to 220".

L. Verify BWST T3 Outlet to OP HPI pump (CV-1407 or CV-1408) open.

M. **WHEN** PZR level is ≥ 100",
THEN establish maximum Letdown flow allowed by cooling capacity and component limitations.

(1. CONTINUED ON NEXT PAGE)

EMERGENCY BORATION

1. (Continued)

N. Perform the following as necessary to maintain Makeup Tank level 55 to 86":

1) Close Batch Controller Outlet (CV-1250).

2) Stop running Boric Acid pump(s):

- P39A
- P39B

3) Place 3-Way Valve (CV-1248) in BLEED.

4) **WHEN** Makeup Tank level is lowered to desired level,
THEN perform the following:

a) Return 3-Way Valve (CV-1248) to LETDOWN.

b) Start available Boric Acid pump(s) (P39A or P39B or both).

c) Open Batch Controller Outlet (CV-1250).

O. As time permits, determine actual required boration as follows:

1) Obtain required boron concentration from Plant Data Book. ________ PPM

2) Calculate batch add required using Plant Computer
OR
Soluble Poison Concentration Control (1103.004), Attachment A.3,
"Feed Volume For Batch Boration or Dilution". ________ gal

3) Use 1103.004, Attachment D, "Volume of BAAT Vs. Depth of Liquid"
to determine desired final BAAT level. ________ ”

(1. CONTINUED ON NEXT PAGE)

EMERGENCY BORATION

1. (Continued)

P. **<u>WHEN</u>** required amount of boric acid has been added per **step 1.O.**
<u>OR</u>
as determined by Reactor Engineering,
<u>THEN</u> perform the following:

1) Stop Boric Acid pump(s):

- P39A
- P39B

2) Close Batch Controller Outlet (CV-1250).

3) Verify Makeup Tank level 55 to 86".

4) Close BWST T3 Outlet to OP HPI pump (CV-1407 or CV-1408).

5) Adjust Letdown flow to desired rate.

EMERGENCY BORATION

2. **<u>IF</u> HPI will be used for emergency boration,**
<u>THEN</u> perform the following:

A. Initiate HPI per RT-2.

B. Verify HPI Block valve (CV-1220 or CV-1285) associated with running HPI pump open.

C. **<u>IF</u>** Letdown is in service,
<u>THEN</u> place 3-Way Valve (CV-1248) in BLEED.

D. **<u>WHEN</u>** PZR level is ≥ 100",
<u>THEN</u> establish maximum Letdown flow allowed by cooling capacity and component limitations.

E. Maintain PZR level 200 to 220" as follows:

1) Verify both HPI Pump RECIRC Blocks open:

- CV-1300
- CV-1301

2) Throttle HPI Block valve (CV-1220 or CV-1285) as necessary.

F. As time permits, determine actual required boration as follows:

1) Obtain required boron concentration from Plant Data Book. ________ PPM

2) Calculate final BWST level for required boron addition using Plant Computer
<u>OR</u>
Soluble Poison Concentration Control (1103.004), Attachment A.6, "Continuous Feed and Bleed from BWST". ________ ft

G. **<u>WHEN</u>** required amount of boric acid has been added per **step 2.F.**
<u>OR</u>
as determined by Reactor Engineering,
<u>THEN</u> perform the following:

1) Operate HPI as directed by CRS.

2) Adjust Letdown flow as directed by CRS.

END

ATTACHMENT 1

NOTE
Supplying ANO-1 from an off-site source (SU#1 and/or SU#2) will raise the risk of a grid-initiated offsite source feeder undervoltage relay actuation which will trip the offsite feeder breaker(s) to A and H buses and initiate auto-transfer of these buses to the selected offsite source (Refer to CR-ANO-2-2014-0707).

8.0 Transferring Buses from Unit Aux to SU1

8.1 Perform the following:

8.1.1 Check SU1 Transformer is considered operable.

8.1.2 IF time permits,
THEN establish flash protection boundary at affected breakers.

{4.3.4}

CAUTION
High circulating currents can trip bus lockout relay if both feeder breakers remain closed. Delaying steps which open a feeder breaker when both feeder breakers remain closed allow high circulating currents to develop.

8.2 IF desired to transfer A1 from Unit Aux to SU1,
THEN perform the following:

8.2.1 Check Startup Xfmr #1 Feed to A1 (A-113) NOT in Local.

8.2.2 Place A-113 Synchronize switch to ON.

8.2.3 Check synchroscope between 11 and 1 o'clock.

8.2.4 Close A-113 AND allow control switch to return to NORMAL-AFTER-CLOSE position.

8.2.5 Place A-113 Synchronize switch to OFF.

8.2.6 Check Unit Auxiliary Xfmr Feed to A1 (A-112) open.

CRITICAL STEP

{4.3.4}

A. IF A-112 is NOT open,
THEN trip A-112.

1. IF A-112 will NOT trip,
THEN trip A-113.

2. Initiate Condition Report.

8.2.7 IF A-112 opened automatically,
THEN place A-112 control switch in NORMAL-AFTER-TRIP.

{4.3.4}

> **CAUTION**
> **High circulating currents can trip bus lockout relay if both feeder breakers remain closed. Delaying steps which open a feeder breaker when both feeder breakers remain closed allow high circulating currents to develop.**

8.3 IF desired to transfer A2 from Unit Aux to SU1,
THEN perform the following:

8.3.1 Check Startup Xfmr #1 Feed to A2 (A-213) NOT in Local.

8.3.2 Place A-213 Synchronize switch to ON.

8.3.3 Check synchroscope between 11 and 1 o'clock.

8.3.4 Close A-213 AND allow control switch to return to NORMAL-AFTER-CLOSE position.

8.3.5 Place A-213 Synchronize switch to OFF.

8.3.6 Check Unit Auxiliary Xfmr Feed to A2 (A-212) open.

CRITICAL STEP

{4.3.4}

**A. IF A-212 is NOT open,
THEN trip A-212.**

**1. IF A-212 will NOT trip,
THEN trip A-213.**

2. Initiate Condition Report.

8.3.7 IF A-212 opened automatically,
THEN place A-212 control switch in NORMAL-AFTER-TRIP.

{4.3.4}

CAUTION

High circulating currents can trip bus lockout relay if both feeder breakers remain closed. Delaying steps which open a feeder breaker when both feeder breakers remain closed allow high circulating currents to develop.

8.4 IF desired to transfer H1 from Unit Aux to SU1, THEN perform the following:

8.4.1 Check Startup Xfmr #1 Feed to H1 (H-15) NOT in Local.

8.4.2 Place H-15 Synchronize switch to ON.

8.4.3 Check synchroscope between 11 and 1 o'clock.

8.4.4 Close H-15 AND allow control switch to return to NORMAL-AFTER-CLOSE position.

8.4.5 Place H-15 Synchronize switch to OFF.

8.4.6 Check Unit Auxiliary Xfmr Feed to H1 (H-14) open.

CRITICAL STEP

{4.3.4}

A. IF H-14 is NOT open, THEN trip H-14.

1. IF H-14 will NOT trip, THEN trip H-15.

2. Initiate Condition Report.

8.4.7 IF H-14 opened automatically, THEN place H-14 control switch in NORMAL-AFTER-TRIP.

{4.3.4}

> **<u>CAUTION</u>**
> **High circulating currents can trip bus lockout relay if both feeder breakers remain closed. Delaying steps which open a feeder breaker when both feeder breakers remain closed allow high circulating currents to develop.**

8.5 <u>IF</u> desired to transfer H2 from Unit Aux to SU1,
<u>THEN</u> perform the following:

8.5.1 Check Startup Xfmr #1 Feed to H2 (H-25) <u>NOT</u> in Local.

8.5.2 Place H-25 Synchronize switch to ON.

8.5.3 Check synchroscope between 11 and 1 o'clock.

8.5.4 Close H-25 AND allow control switch to return to NORMAL-AFTER-CLOSE position.

8.5.5 Place H-25 Synchronize switch to OFF.

8.5.6 Check Unit Auxiliary Xfmr Feed to H2 (H-24) open.

CRITICAL STEP

{4.3.4}

A. <u>IF</u> H-24 is <u>NOT</u> open,
<u>THEN</u> trip H-24.

1. <u>IF</u> H-24 will <u>NOT</u> trip,
<u>THEN</u> trip H-25.

2. Initiate Condition Report.

8.5.7 <u>IF</u> H-24 opened automatically,
<u>THEN</u> place H-24 control switch in NORMAL-AFTER-TRIP.

8.6 Check the following bus voltages:

- 4160V buses greater than 3640V (C10)
- 6900V buses greater than 6010V (C10)
- 480V buses between 460V and 500V (SPDS E1B5/E1B6)

8.6.1 <u>IF</u> necessary,
<u>THEN</u> adjust per "Startup Transformer Voltage Regulator Operation" section of this procedure.

Facility: ANO Unit 1 Date of Exam: 8/18-23/16 Operating Test No.: 2016-1

APPLICANT	EVENT TYPE	Scenarios												TOTAL	MINIMUM(*)		
		1			2 (Spare)			3			5						
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION						
		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP		R	I	U
RO-1	RX													0	1	1	0
	NOR									1				1	1	1	1
	I/C									3, 4, 7, 9,		2, 3, 8, 9		8	4	4	2
	MAJ									6		7		2	2	2	1
	TS													0	0	2	2
RO-2	RX		2											1	1	1	0
	NOR									1				1	1	1	1
	I/C		3, 6, 8, 9							3, 4, 7, 9,				8	4	4	2
	MAJ		7							6				2	2	2	1
	TS													0	0	2	2
RO-3	RX													0	1	1	0
	NOR			1										1	1	1	1
	I/C			4, 5, 10								2, 3, 8, 9		7	4	4	2
	MAJ			7								7		2	2	2	1
	TS													0	0	2	2
RO-4	RX													0	1	1	0
	NOR									1				1	1	1	1
	I/C									3, 4, 7, 9,		2, 3, 8, 9		8	4	4	2
	MAJ									6		7		2	2	2	1
	TS													0	0	2	2

Instructions:

1. Check the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must serve in both the “at-the-controls” (ATC) and “balance-of-plant” (BOP) positions. Instant SROs (SRO-I) must serve in both the SRO and the ATC positions, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position. If an SRO-I *additionally* serves in the BOP position, one I/C malfunction can be credited toward the two I/C malfunctions required for the ATC position.

2. Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. (*) Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a one-for-one basis.

3. Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant’s competence count toward the minimum requirements specified for the applicant’s license level in the right-hand columns.

4. For licensees that use the ATC operator primarily for monitoring plant parameters, the chief examiner may place SRO-I applicants in either the ATC or BOP position to best evaluate the SRO-I in manipulating plant controls.

Facility: ANO Unit 1 Date of Exam: 8/18-23/16 Operating Test No.: 2016-1

APPLICANT	EVENT TYPE	Scenario 1 CREW POSITION SRO	Scenario 1 CREW POSITION ATC	Scenario 1 CREW POSITION BOP	Scenario 2 (Spare) CREW POSITION SRO	Scenario 2 (Spare) CREW POSITION ATC	Scenario 2 (Spare) CREW POSITION BOP	Scenario 3 CREW POSITION SRO	Scenario 3 CREW POSITION ATC	Scenario 3 CREW POSITION BOP	Scenario 5 CREW POSITION SRO	Scenario 5 CREW POSITION ATC	Scenario 5 CREW POSITION BOP	TOTAL	MINIMUM(*) R	MINIMUM(*) I	MINIMUM(*) U
RO-5	RX													0	1	1	0
	NOR			1									1	2	1	1	1
	I/C			4, 5, 10					2, 4, 5, 8				4, 5, 6	10	4	4	2
	MAJ			7					6				7	3	2	2	1
	TS													0	0	2	2
RO-7	RX		2											1	1	1	0
	NOR												1	1	1	1	1
	I/C		3, 6, 8, 9										4, 5, 6	7	4	4	2
	MAJ		7										7	2	2	2	1
	TS													0	0	2	2
RO-8	RX													0	1	1	0
	NOR												1	1	1	1	1
	I/C								2, 4, 5, 8				4, 5, 6	7	4	4	2
	MAJ								6				7	2	2	2	1
	TS													0	0	2	2
RO-9	RX		2											1	1	1	0
	NOR									1			1	2	1	1	1
	I/C		3, 6, 8, 9							3, 4, 7, 9,			4, 5, 6	11	4	4	2
	MAJ		7							6			7	3	2	2	1
	TS													0	0	2	2

Facility: ANO Unit 1 Date of Exam: 8/18-23/16 Operating Test No.: 2016-1

APPLICANT	EVENT TYPE	Scenario 1 CREW POSITION SRO	Scenario 1 CREW POSITION ATC	Scenario 1 CREW POSITION BOP	Scenario 2 (Spare) CREW POSITION SRO	Scenario 2 (Spare) CREW POSITION ATC	Scenario 2 (Spare) CREW POSITION BOP	Scenario 3 CREW POSITION SRO	Scenario 3 CREW POSITION ATC	Scenario 3 CREW POSITION BOP	Scenario 5 CREW POSITION SRO	Scenario 5 CREW POSITION ATC	Scenario 5 CREW POSITION BOP	TOTAL	MINIMUM(*) R	MINIMUM(*) I	MINIMUM(*) U
SRO-I-2	RX													0	1	1	0
	NOR			1							1			2	1	1	1
	I/C			4, 5, 10					2, 4, 5, 8		2, 3, 4, 5, 6, 8, 9			14	4	4	2
	MAJ			7					6		7			3	2	2	1
	TS										2, 6			2	0	2	2
SRO-I-4	RX	2												1	1	1	0
	NOR	1						1						2	1	1	1
	I/C	3, 4, 5, 6, 8, 9, 10						2, 3, 4, 5, 7, 8, 9				2, 3, 8, 9		18	4	4	2
	MAJ	7						6				7		3	2	2	1
	TS	3, 4						1, 2						4	0	2	2
SRO-I-5	RX		2											1	1	1	0
	NOR										1			1	1	1	1
	I/C		3, 6, 8, 9								2, 3, 4, 5, 6, 8, 9			11	4	4	2
	MAJ		7								7			2	2	2	1
	TS										2, 6			2	0	2	2
SRO-U-1	RX	2												1	1	1	0
	NOR	1						1						2	1	1	1
	I/C	3, 4, 5, 6, 8, 9, 10						2, 3, 4, 5, 7, 8, 9						14	4	4	2
	MAJ	7						6						2	2	2	1
	TS	3, 4						1, 2						4	0	2	2

Facility: ANO Unit 1						Date of Exam: 8/18-23/16						Operating Test No.: 2016-1					
APPLICANT	EVENT TYPE	Scenarios													TOTAL	MINIMUM(*)		
		1			2 (Spare)			3			5						
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION						
		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP		R	I	U
SRO-U-3	RX	2												1	1	1	0
	NOR	1									1			2	1	1	1
	I/C	3, 4, 5, 6, 8, 9, 10									2, 3, 4, 5, 6, 8, 9			14	4	4	2
	MAJ	7									7			2	2	2	1
	TS	3, 4									2, 6			4	0	2	2
SRO-U-4	RX													0	1	1	0
	NOR							1			1			2	1	1	1
	I/C							2, 3, 4, 5, 7, 8, 9			2, 3, 4, 5, 6, 8, 9			14	4	4	2
	MAJ							6			7			2	2	2	1
	TS							1, 2			2, 6			4	0	2	2
NA	RX																
	NOR																
	I/C																
	MAJ																
	TS																
NA	RX																
	NOR																
	I/C																
	MAJ																
	TS																

Facility: ANO Unit 1 Date of Exam: 8/18-23/16 Operating Test No.: 2016-1

APPLICANT	EVENT TYPE	Scenarios												TOTAL	MINIMUM(*)		
		1			3			4			NA						
		CREW POSITION			CREW POSITION			CREW POSITION			NA						
		SRO	ATC	BOP	SRO	ATC	BOP	SRO	ATC	BOP					R	I	U
RO-6	RX													0	1	1	0
	NOR			1										1	1	1	1
	I/C			4, 5, 10		2, 4, 5, 8				2, 3, 5, 6, 9				12	4	4	2
	MAJ			7		6				7				3	2	2	1
	TS													0	0	2	2
SRO-I-3	RX	2							1					2	1	1	0
	NOR	1												1	1	1	1
	I/C	3, 4, 5, 6, 8, 9, 10							3, 4, 6, 8					11	4	4	2
	MAJ	7							7					2	2	2	1
	TS	3, 4												2	0	2	2
SRO-U-2	RX							1						1	1	1	0
	NOR				1									1	1	1	1
	I/C				2, 3, 4, 5, 7, 8, 9			2, 3, 4, 5, 6, 8, 9						14	4	4	2
	MAJ				6			7						2	2	2	1
	TS				1, 2			2, 6						4	0	2	2
NA	RX																
	NOR																
	I/C																
	MAJ																
	TS																

Facility: ANO-1 Date of Examination: 8/22/16 Operating Test No.: 2016-1

Competencies	APPLICANTS							
	U1		U2		U3		U4	
	SCENARIO		SCENARIO		SCENARIO		SCENARIO	
	1	3	3	4	**1**	**5**	**3**	**5**
Interpret/Diagnose Events and Conditions	3,4,5,6, 7,8,9, 10	1,2,3,4, 5,6,7,8, 9	1,2,3, 4,5,6, 7,8,9	2,3,4,5, 6,7,8,9	3,4,5, 6,7,8, 9,10	2,3,4, 5,6,7, 8,9	1,2,3, 4,5,6, 7,8,9	2,3,4,5, 6,7,8,9
Comply With and Use Procedures (1)	1,2,3,4, 5,6,7,8, 9,10	1,2,3,4, 5,6,7,8, 9	1,2,3, 4,5,6, 7,8,9	1,2,3,4, 5,6,7,8, 9	1,2,3, 4,5,6, 7,8,9, 10	1,2,3, 4,5,6, 7,8,9	1,2,3, 4,5,6, 7,8,9	1,2,3,4, 5,6,7,8, 9
Operate Control Boards (2)								
Communicate and Interact	1,2,3,4, 5,6,7,8, 9,10	1,2,3,4, 5,6,7,8, 9	1,2,3, 4,5,6, 7,8,9	1,2,3,4, 5,6,7,8, 9	1,2,3, 4,5,6, 7,8,9, 10	1,2,3, 4,5,6, 7,8,9	1,2,3, 4,5,6, 7,8,9	1,2,3,4, 5,6,7,8, 9
Demonstrate Supervisory Ability (3)	1,2,3,4, 5,6,7,8, 9,10	1,2,3,4, 5,6,7,8, 9	1,2,3, 4,5,6, 7,8,9	1,2,3,4, 5,6,7,8, 9	1,2,3, 4,5,6, 7,8,9, 10	1,2,3, 4,5,6, 7,8,9	1,2,3, 4,5,6, 7,8,9	1,2,3,4, 5,6,7,8, 9
Comply With and Use Tech. Specs. (3)	3,4	1,2	1,2	2,6	3,4	2.6	1,2	2.6

Notes:
(1) Includes Technical Specification compliance for an RO.
(2) Optional for an SRO-U.
(3) Only applicable to SROs.

Instructions:

Check the applicants' license type and enter one or more event numbers that will allow the examiners to evaluate every applicable competency for every applicant. (This includes all rating factors for each competency.) (Competency Rating factors as described on forms ES-303-1 and ES-303-3.

Facility: ANO-1 Date of Examination: 8/22/16 Operating Test No.: 2016-1

Competencies	APPLICANTS									
	I2 SRO/ATC/BOP			I3 SRO / ATC		I4 SRO/SRO/ATC			I5 SRO / ATC	
	SCENARIO			SCENARIO		SCENARIO			SCENARIO	
	5	3	1	1	4	1	3	5	5	1
Interpret/Diagnose Events and Conditions	2,3,4,5,6,7,8,9	2,5,6,8	4,5,7,10	3,4,5,6,7,8,9, 10	3,4,5,6,7,8,9	3,4,5,6,7,8,9,10	1,2,3,4,5,6,7,8,9	4,5,6,7	2,3,4,5,6,7,8,9	3,6,8,9
Comply With and Use Procedures (1)	1,2,3,4,5,6,7,8,9	2,5,6,8	1,4,5,7,10	1,2,3,4,5,6,7,8,9,10	1,3,4,5,6,7,8	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5,6,7,8,9	1,4,5,6,7	1,2,3,4,5,6,7,8,9	2,3,6,7,8,9
Operate Control Boards (2)		2,5,6,8	1,4,5,7,10		1,3,4,5,6,7,8			1,4,5,6,7		2,3,6,7,8,9
Communicate and Interact	1,2,3,4,5,6,7,8,9	2,4,5,6,8	1,4,5,7,10	1,2,3,4,5,6,7,8,9,10	1,3,4,5,6,7,8,9	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5,6,7,8,9	1,4,5,6,7	1,2,3,4,5,6,7,8,9	1,2,3,6,7,8,9
Demonstrate Supervisory Ability (3)	1,2,3,4,5,6,7,8,9			1,2,3,4,5,6,7,8,9,10		1,2,3,4,5,6,7,8,9,10	1,2,3,4,5,6,7,8,9		1,2,3,4,5,6,7,8,9	
Comply With and Use Tech. Specs. (3)	2.6			3,4		3,4	1,2		2.6	

Notes:
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Facility: ANO-1 Date of Examination: 8/22/16 Operating Test No.: 2016-1

Competencies	APPLICANTS							
	R1 / R8 ATC / BOP		R2 ATC / BOP		R3 ATC / BOP		R4 ATC / BOP	
	SCENARIO		SCENARIO		SCENARIO		SCENARIO	
	3	**5**	**1**	**3**	**5**	**1**	**5**	**3**
Interpret/Diagnose Events and Conditions	2,5,6,8	4,5,6,7	3,6,8, 9	1,3,4,6, 7,9	4,5,6, 7	4,5,7, 10	4,5,6, 7	1,3,4,6, 7,9
Comply With and Use Procedures (1)	2,5,6,8	1,4,5,6, 7	2,3,6, 7,8,9	1,3,4,6, 7,9	1,4,5, 6,7	1,4,5, 7,10	1,4,5, 6,7	1,3,4,6, 7,9
Operate Control Boards (2)	2,5,6,8	1,4,5,6, 7	2,3,6, 7,8,9	1,3,4,6, 7,9	1,4,5, 6,7	1,4,5, 7,10	1,4,5, 6,7	1,3,4,6, 7,9
Communicate and Interact	2,4,5,6, 8	1,4,5,6, 7	1,2,3, 6,7,8, 9	1,3,4,5, 6,7,9	1,4,5, 6,7	1,4,5, 7,10	1,4,5, 6,7	1,3,4,5, 6,7,9
Demonstrate Supervisory Ability (3)								
Comply With and Use Tech. Specs. (3)								

Notes:
(1) Includes Technical Specification compliance for an RO.
(2) Optional for an SRO-U.
(3) Only applicable to SROs.

Instructions:

Check the applicants' license type and enter one or more event numbers that will allow the examiners to evaluate every applicable competency for every applicant. (This includes all rating factors for each competency.) (Competency Rating factors as described on forms ES-303-1 and ES-303-3.

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Competencies	APPLICANTS										
	R5 ATC/BOP/BOP			R7 ATC / BOP		R6 ATC/BOP/BOP			R9 ATC/BOP/BOP		
	SCENARIO			SCENARIO		SCENARIO					
	5	**1**	**3**	**1**	**5**	**3**	**1**	**4**	**1**	**5**	**3**
Interpret/Diagnose Events and Conditions	4,5,6,7	4,5,7,10	1,3,4,6,7,9	3,6,8,9	4,5,6,7	2,5,6,8	4,5,7,10	2,4,5,6,7,9	3,6,8,9	4,5,6,7	1,3,4,6,7,9
Comply With and Use Procedures (1)	1,4,5,6,7	1,4,5,7,10	1,3,4,6,7,9	2,3,6,7,8,9	1,4,5,6,7	2,5,6,8	1,4,5,7,10	1,2,3,5,6,7,9	2,3,6,7,8,9	1,4,5,6,7	1,3,4,6,7,9
Operate Control Boards (2)	1,4,5,6,7	1,4,5,7,10	1,3,4,6,7,9	2,3,6,7,8,9	1,4,5,6,7	2,5,6,8	1,4,5,7,10	2,4,5,6,7,9	2,3,6,7,8,9	1,4,5,6,7	1,3,4,6,7,9
Communicate and Interact	1,4,5,6,7	1,4,5,7,10	1,3,4,5,6,7,9	1,2,3,6,7,8,9	1,4,5,6,7	2,4,5,6,8	1,4,5,7,10	1,2,3,5,6,7,9	1,2,3,6,7,8,9	1,4,5,6,7	1,3,4,5,6,7,9
Demonstrate Supervisory Ability (3)											
Comply With and Use Tech. Specs. (3)											

Notes:
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(2) Optional for an SRO-U.
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Instructions:
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