Facility:	**WATERFORD 3**	Date of Examination:	**October 5, 2009**
Examination Level:	**RO**	Operating Test Number:	**1**

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
A1 Conduct of Operations K/A Importance: 4.3	S, D	2.1.23, Ability to perform specific system and integrated plant procedures during all modes of plant operation. Calculate Shutdown Margin and Volume of Primary Makeup Water for Dilution to the Volume Control Tank.
A2 Conduct of Operations K/A Importance: 3.6	R, M	2.1.18, Ability to make accurate, clear, and concise logs, records, status boards, and reports. Complete OP-004-005, Core Operating Limits Supervisory System Operation, Attachment 11.6, Calculation of Charging and Letdown Parameters.
A3 Equipment Control K/A Importance: 3.7	R, N	2.2.12, Knowledge of surveillance procedures Complete surveillance OP-903-008, Reactor Coolant System Isolation Leakage Test, Attachment 10.11 for SI-329 A.
A4 Radiation Control K/A Importance: 3.2	R, N	2.3.4, Knowledge of radiation exposure limits under normal and emergency conditions. Calculate stay time to perform a tagout verification in the Regen Heat Exchanger Room. Room dose rate & operator's yearly dose provided.
Emergency Plan		Not selected

NOTE: All items (5 total are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when 5 are required.

* 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:	**WATERFORD 3**	Date of Examination:	**October 5, 2009**
Examination Level:	**SRO**	Operating Test Number:	**1**

Administrative Topic (see Note)	Type Code*	Describe activity to be performed
A5 Conduct of Operations K/A Importance: 4.4	R, N	2.1.23, Ability to perform specific system and integrated plant procedures during all modes of plant operation. Verify Core Protection Calculator, Plant Protection System, and Calorimetric power are within limits during power ascension in accordance with OP-010-004 Power Operations, and OP-903-001, Technical Specification Surveillance Logs.
A6 Conduct of Operations K/A Importance: 4.6	R, M	2.1.20, Ability to interpret and execute procedure steps Perform SM/CRS review OP-901-501, PMC or Core Operating Limit Supervisory System Malfunction, Attachments 1, 2, and 3 following a PMC failure.
A7 Equipment Control K/A Importance: 4.7	R, N	2.2.40, Ability to apply Technical Specifications for a system. Review surveillance OP-903-008, Reactor Coolant System Isolation Leakage Test, Attachment 10.11 for SI-329 A.
A8 Radiation Control K/A Importance: 3.7	R, N	2.3.4, Knowledge of radiation exposure limits under normal and emergency conditions. Calculate dose and assign non-licensed operators to vent Safety Injection piping in Safeguards Room A. Given dose rate with and without shielding installed, time to install shielding, and job completion time using 1 operator or using 2 operators, determine proper job assignment.
A9 Emergency Plan K/A Importance: 4.6	S, M	2.4.41, Knowledge of the emergency action level thresholds and classifications. Determine appropriate Emergency Plan EAL.

NOTE: All items (5 total are required for SROs. RO applicants require only 4 items unless they are retaking only the administrative topics, when 5 are required.

* 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)

Waterford 3

2009 NRC Exam

JOB PERFORMANCE MEASURE

A1

Calculate Shutdown Margin and Volume of Primary Makeup Water for Dilution to the Volume Control Tank

Applicant: _____

Examiner: _____

JOB PERFORMANCE MEASURE
DATA PAGE

Task: Calculate Shutdown Margin and Volume of Primary Makeup Water for Dilution to the Volume Control Tank

Task Standard: Applicant correctly calculates Shutdown Margin in accordance with OP-903-090 and correctly calculates the quantity of PMU to lower the RCS boron concentration from 1,000 to a value 50 ppm above Shutdown Margin required boron concentration.

References: OP-002-005, Chemical and Volume Control System
OP-903-090, Shutdown Margin

Validation Time: 30 minutes Time Critical: No

Alternate Path: No

Applicant: _____

Time Start: _____ Time Finish: _____

Performance Time: _____ minutes

Performance Rating: SAT UNSAT

Comments: _____

_____

_____

_____

_____

Examiner: _____ Date: _____
Signature

EXAMINER COPY ONLY

Tools/Equipment/Procedures Needed:

OP-002-005, Chemical and Volume Control System
OP-903-090, Shutdown Margin

Description:
First, the applicant will be required to calculate Shutdown Margin based on given plant conditions. Secondly, the applicant will be required to calculate the amount of Primary Makeup Water needed to lower RCS boron concentration to a value 50 ppm greater than RCS boron concentration required by OP-903-090.

DIRECTION TO APPLICANT:

Each administrative JPM has a cue sheet with the instructions for that JPM. Each administrative JPM stands alone, and conditions from 1 JPM do not carry over to any other JPM. If you have any questions, raise your hand and I will come to your desk.

Provide all answers on the sheets provided.

INITIAL CONDITIONS:

- The plant was shutdown after operating at 85% power for 7 days for Heater Drain Pump maintenance.
- The Plant is in Mode 4.
- The shutdown was completed 30 hours ago.
- Cycle Burnup from PMC PID C24110 is 250 EFPD.
- RCS Tave is 275 °F.
- RCS boron concentration is 1000 ppm.
- All CEAs are inserted.
- The Reactivity Bias Factor is 0.0
- Reactor Coolant Pumps 1B and 2B are operating.

INITIATING CUES:

A. The CRS directs you to calculate Required Shutdown Margin Boron Concentration for the next 24 hours in accordance with OP-903-090, Shutdown Margin.

B. Based on the results of the Shutdown Margin calculation, calculate the amount of Primary Makeup Water required to lower RCS boron concentration from its current value to 50 ppm **above** the 24 hour required Shutdown Margin concentration.

TASK ELEMENT	STANDARD
Procedure Note 1) The Shutdown Margin surveillance is satisfied in accordance with OP-903-001, Technical Specification Surveillance Logs, if the reactor is critical with no Untrippable CEAs and all CEAs are above Transient Insertion Limits. Reference Technical Specification 4.1.1.1.1.b. 2) When using graphs and tables in the Plant Data Book (PDB), to obtain the necessary data, it may be necessary and is acceptable to interpolate (approximate between data points or curves). However, extrapolation (approximation outside of the bounds of the data or curves) should not be used. 3) Xenon is considered at "equilibrium" when Reactor Power has remained in a ± 1% RTP band for at least 36 hours.	Note reviewed.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
7.1.2 Document the following current plant data on Attachment 10.1, Shutdown Margin Verification Work Sheet –CEAs Inserted: • Date and Time • Plant Mode • Cycle Burnup (Point ID C24110 or equivalent) • RCS Boron Concentration • TAVG • Duration of Shutdown • CEA Position	Data recorded.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
7.1.3.1.1 Determine current Xenon Free Shutdown Margin Boron Concentration for plant conditions recorded in step 7.1.2 using applicable Plant Data Book (PDB) Figure 1.3.4.x, SDM Boron Concentration vs. Burnup.	Proper value obtained from graph 1.3.4.1.
Comment: Band for value = 890-910	**<u>Critical</u>** **SAT / UNSAT**

TASK ELEMENT	STANDARD
7.1.3.1.2 Enter the Reactivity BIAS Factor found in the Reactor Engineering Book on Attachment 10.1.	Value recorded.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
7.1.3.1.3 Determine current HZP Inverse Boron Worth, using current EFPD and PDB Figure 1.4.1, HZP Inverse Boron Worth vs. Burnup.	Proper value obtained.
Comment: Band for value = 116.0 – 117.5	**SAT / UNSAT**

TASK ELEMENT	STANDARD
7.1.3.1.4 Using temperature recorded in step 7.1.2.5, Determine current Normalized Boron Worth from PDB Figure 1.4.2, Boron Worth Versus Moderator Temperature Normalized to 541°F.	Proper value obtained.
Comment: Band for value = 1.25 - 1.26	**SAT / UNSAT**

TASK ELEMENT	STANDARD
7.1.3.1.5 Using the formula on Attachment 10.1, Calculate the current Xenon Free Shutdown Margin Boron Concentration.	Calculation completed.
Comment: Band for value = 890 - 910	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
7.1.3.3.1 Determine current Xenon Reactivity Worth, for plant conditions recorded in step 7.1.2 using PDB Figure 1.6.3, Xenon Worth after Trip, or RHOBAL Program.	Proper value obtained from figure 1.6.3.2.
Comment: Band for value = -1.65 to -1.75	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
7.1.3.3.2 Determine current HZP Inverse Boron Worth, using current EFPD the PDB Figure 1.4.1, HZP Inverse Boron Worth vs. Burnup.	Proper value obtained.
Comment: Band for value = 116.0 – 117.5	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
7.1.3.3.3 Using temperature from step 7.1.2.5, Determine current Normalized Boron Worth from PDB Figure 1.4.2, Boron Worth Versus Moderator Temperature Normalized to 541°F.	Proper value obtained.
Comment: Band for value = 1.25 - 1.26	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
7.1.3.3.4 Using formula on Attachment 10.1, Calculate Xenon Equivalent Boron Concentration.	Calculation completed.
Comment: Band for value = ─ 151.9 to ─ 164.5	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
7.1.3.4 Using formula on Attachment 10.1, Calculate Required Shutdown Margin Boron Concentration.	Calculation completed.
Comment: Band for value = 725.5 – 758.1	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
7.1.4 Verify Shutdown Margin meets requirements of Technical Specifications by verifying current RCS Boron Concentration (step 7.1.2.4) is ≥ Required Shutdown Margin Boron Concentration (step 7.1.3.4).	Verification complete.
Comment: Yes is circled on Attachment 10.1.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Procedure Note Step 7.1.6 verifies required Shutdown Margin for the next 24 hours will be met while Xenon is decaying after Shutdown. Step 7.1.6 is not applicable 72 hours after Reactor Shutdown.	Note reviewed.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
7.1.6.1.1 Determine Xenon Reactivity Worth 24 hours from present time using PDB Figure 1.6.3, Xenon Worth after Trip or RHOBAL Program.	Proper value obtained.
Comment: Band = − 0.3 to − 0.4	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
7.1.6.1.2 Obtain HZP Inverse Boron Worth from Step 7.1.3.3.2 .	Value obtained.
Comment: Band = 116.0 – 117.5	**SAT / UNSAT**

TASK ELEMENT	STANDARD
7.1.6.1.3 Obtain Normalized Boron Worth from Step 7.1.3.3.3.	Value obtained.
Comment: Band = 1.25 - 1.26	**SAT / UNSAT**

TASK ELEMENT	STANDARD
7.1.6.1.4 Using Formula on Attachment 10.1, Calculate Xenon Equivalent Boron Concentration required to meet Shutdown Margin for the next 24 hour period.	Calculation completed.
Comment: Band = – 27.6 to – 37.6	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
7.1.6.2 Using formula on Attachment 10.1, calculate Required Shutdown Margin Boron Concentration.	Calculation completed.
Comment: Band = 852.4 – 882.4	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
7.1.6.3 Verify Shutdown Margin will be met for the next 24 hours by verifying current RCS Boron Concentration (step 7.1.2.4) is ≥ Required Shutdown Margin Boron Concentration for the next 24 hours as calculated in step 7.1.6.2.	Verification completed.
Comment: Yes is circled.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
OP-002-005, attachment 11.7, step 11.7.1 Check the appropriate RCS Volume based on Reactor Power.	V_{RCS} = 62,126 gals checked.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
11.7.2 Record data:	Data recorded from cue sheet.
Comment: Initial RCS Boron = 1,000 ppm C_{RCSi} Desired final RCS Boron Concentration 902.4 – 932.4 ppm C_{RCSf} (SDM calculation + 50 ppm)	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
11.7.3 Calculate the volume of Primary Makeup water to be added V_{PW}	Calculation completed.
Comment: Band = 4,348 to 6,408	**Critical** **SAT / UNSAT**

END OF TASK

APPLICANT CUE SHEET

(TO BE RETURNED TO EXAMINER TO UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

- The plant was shutdown after operating at 85% power for 7 days for Heater Drain Pump maintenance.
- The Plant is in Mode 4.
- The shutdown was completed 30 hours ago.
- Cycle Burnup from PMC PID C24110 is 250 EFPD.
- RCS Tave is 275 °F.
- RCS boron concentration is 1000 ppm.
- All CEAs are inserted.
- The Reactivity Bias Factor is 0.0
- Reactor Coolant Pumps 1B and 2B are operating.

INITIATING CUES:

A. The CRS directs you to calculate Required Shutdown Margin Boron Concentration for the next 24 hours in accordance with OP-903-090, Shutdown Margin.

B. Based on the results of the Shutdown Margin calculation, calculate the amount of Primary Makeup Water required to lower RCS boron concentration from its current value to 50 ppm **above** the 24 hour required Shutdown Margin concentration.

JPM A1 KEY

11.7 CALCULATION OF PRIMARY MAKEUP WATER VOLUME FOR DIRECT DILUTION OR VCT DILUTE MAKEUP MODE

11.7.1 Check the appropriate RCS Volume (V_{RCS}) based on Reactor Power:

Reactor Power from 0 - 15%: V_{RCS} = 62,126 GAL ☒

Reactor Power from 15 - 100%: V_{RCS} = 61,421 GAL ☐

11.7.2 Record the following data:

Initial RCS Boron Concentration (C_{RCSi}): **1,000** PPM

Desired Final RCS Boron Concentration (C_{RCSf}): **902.4 – 932.4** PPM

11.7.3 Calculate the volume (gallons) of Primary Makeup water to be added (V_{PW}):

$$V_{PW} = V_{RCS} \times \ln\left(\frac{C_{RCSi}}{C_{RCSf}}\right)$$

$$V_{PW} = \underline{\mathbf{62,126}}\ \text{GAL} \times \ln\left(\frac{\underline{\mathbf{1,000}}\ \text{PPM}}{\mathbf{902.4 - 932.4}\ \text{PPM}}\right) = \underline{\mathbf{4,348 - 6,408}}\ \text{GAL}$$

Performed by: _____ (Signature) _____ (Date) Verified by ①: _____ (Signature) _____ (Date)

① The independent verifier is responsible for verifying the accuracy of recorded data as well as calculations.

JPM A1 Key

7.1.2 PLANT DATA

Step	Description	Value	Units
7.1.2.1	DATE AND TIME		
7.1.2.2	PLANT MODE	**4**	
7.1.2.3	CYCLE BURNUP (POINT ID C24110 OR EQUIVALENT)	**250**	EFPD
7.1.2.4	RCS BORON CONCENTRATION	**1,000**	PPM
7.1.2.5	Tave	**275**	^{o}F
7.1.2.6	DURATION OF SHUTDOWN	**30**	HR(s)
7.1.2.7	CEA POSITION	**ARI**	

7.1.3 REQUIRED SHUTDOWN MARGIN BORON CONCENTRATION

7.1.3.1 XENON FREE SHUTDOWN MARGIN BORON CONCENTRATION

step 7.1.3.1.1 (**890 – 910**) + [step 7.1.3.1.2 (**0**) X step 7.1.3.1.3 (**116.0 – 117.5**) / step 7.1.3.1.4 (**1.25 – 1.26**)] = **890 – 910** PPM (step 7.1.3.1.5)

7.1.3.3 XENON EQUIVALENT BORON CONCENTRATION

step 7.1.3.3.1(**– 1.65 to – 1.75**) X step 7.1.3.3.2 (**116.0 – 117.5**) / step 7.1.3.3.3 (**1.25 – 1.26**) = **–151.9 to – 164.5** PPM (step 7.1.3.3.4)

7.1.3.4 REQUIRED SHUTDOWN MARGIN BORON CONCENTRATION

step 7.1.3.1.5 (**890 - 910**) + step 7.1.3.3.4 (**- 151.9 to - 164.5**) = **725.5 – 758.1** PPM **(NOTE 1)**

7.1.4 SHUTDOWN MARGIN VERIFICATION

ACTUAL CONCENTRATION (STEP 7.1.2.4) ≥ REQUIRED SHUTDOWN MARGIN BORON CONCENTRATION (STEP 7.1.3.4) (circle one) YES NO

7.1.6 SHUTDOWN MARGIN VERIFICATION FOR THE NEXT 24 HOURS

7.1.6.1 XENON EQUIVALENT BORON CONCENTRATION FOR 24 HOURS FROM PRESENT

(N/A IF RX SHUTDOWN >72 HOURS)

step 7.1.6.1.1 (**– 0.3 to – 0.4**) X step 7.1.6.1.2 (**116.0 – 117.5**) = **– 27.6 to – 37.6** PPM (step 7.1.6.1.4)
step 7.1.6.1.3 (**1.25 – 1.26**)

7.1.6.2 REQUIRED SHUTDOWN MARGIN BORON CONCENTRATION FOR NEXT 24 HOURS

(N/A IF RX SHUTDOWN >72 HOURS)

step 7.1.3.1.5 (**890 – 910**) + step 7.1.6.1.4 (**– 27.6 to – 37.6**) = **852.4 – 882.4** PPM **(NOTE 1)**

7.1.6.3 SHUTDOWN MARGIN VERIFICATION

ACTUAL CONCENTRATION (STEP 7.1.2.4) ≥ REQUIRED SHUTDOWN MARGIN BORON CONCENTRATION (STEP 7.1.6.2) (circle one) YES NO N/A

7.1.6.4.1: DATE AND TIME BORATION OF THE RCS WAS COMPLETED TO MEET REQUIRED SHUTDOWN MARGIN BORON CONCENTRATION FOR THE NEXT 24 HOURS [N/A THIS STEP IF ANSWER TO STEP 7.1.6.3 WAS YES OR N/A]

_____/_____
DATE / TIME

NOTE 1: If the RCS is on natural circulation and boron equalization is not possible, then multiply the Required Shutdown Margin Boron Concentration by 1.08.

REMARKS: _____

Performed by: _____ _____
(Signature) (Date)

Verified by: _____ _____
(Signature) (Date)

SM/CRS Review: _____ _____/_____
(Signature) (Date/Time)

7.0 PROCEDURE

7.1 SHUTDOWN MARGIN VERIFICATION - CEAS INSERTED

[P-359, T.S. 4.1.1.1.1.d, T.S. 4.1.1.1.1.e]

NOTE

1) The Shutdown Margin surveillance is satisfied in accordance with OP-903-001, Technical Specification Surveillance Logs, if the reactor is critical with no Untrippable CEAs and all CEAs are above Transient Insertion Limits. Reference Technical Specification 4.1.1.1.1.b.
2) When using graphs and tables in the Plant Data Book (PDB), to obtain the necessary data, it may be necessary and is acceptable to interpolate (approximate between data points or curves). However, extrapolation (approximation outside of the bounds of the data or curves) should not be used.
3) Xenon is considered at "equilibrium" when Reactor Power has remained in a ± 1% RTP band for at least 36 hours.

7.1.1 If performing after a Reactor Trip and Xenon was not at equilibrium prior to the shutdown, then either run a RHOBAL poison transient in accordance with section 7.6, RHOBAL Poison Transient, or Reactor Engineering shall be contacted for new RHOBAL Program data and provide Transient Xenon Worth for the next 72 hours.

7.1.2 Document the following current plant data on Attachment 10.1, Shutdown Margin Verification Work Sheet –CEAs Inserted:

7.1.2.1 Date and Time

7.1.2.2 Plant Mode

7.1.2.3 Cycle Burnup (Point ID C24110 or equivalent)

7.1.2.4 RCS Boron Concentration

7.1.2.5 T_{AVG}

7.1.2.6 Duration of Shutdown

7.1.2.7 CEA Position

NOTE

Xenon Free Shutdown Margin Boron Concentrations were calculated by considering the following factors:

- RCS Boron Concentration
- CEA Position
- RCS Avg Temperature
- Fuel Burnup
- No Xenon
- Equilibrium Samarium Concentration

7.1.3 Determine Required Shutdown Margin Boron Concentration and record on Attachment 10.1 as follows:

7.1.3.1 Determine current Xenon free Shutdown Margin Boron Concentration as follows:

7.1.3.1.1 Determine current Xenon Free Shutdown Margin Boron Concentration for plant conditions recorded in step 7.1.2 using applicable Plant Data Book (PDB) Figure 1.3.4.x, SDM Boron Concentration vs. Burnup.

7.1.3.1.2 Enter the Reactivity BIAS Factor found in the Reactor Engineering Book on Attachment 10.1.

7.1.3.1.2.1 If Reactivity BIAS factor is negative, then enter 0.0.

7.1.3.1.3 Determine current HZP Inverse Boron Worth, using current EFPD and PDB Figure 1.4.1, HZP Inverse Boron Worth vs. Burnup.

7.1.3.1.4 Using temperature recorded in step 7.1.2.5, Determine current Normalized Boron Worth from PDB Figure 1.4.2, Boron Worth Versus Moderator Temperature Normalized to 541°F.

7.1.3.1.5 Using the formula on Attachment 10.1, Calculate the current Xenon Free Shutdown Margin Boron Concentration.

NOTE

Xenon is considered at "equilibrium" when Reactor Power has remained in a ± 1% RTP band for at least 36 hours.

7.1.3.2 If a Reactor Trip occurs during non-equilibrium Xenon conditions, then the RHOBAL Program from either section 7.6, RHOBAL Poison Transient, or Reactor Engineering shall be used to determine initial Xenon Worth.

7.1.3.3 Determine current Xenon Equivalent Boron Concentration as follows:

7.1.3.3.1 Determine current Xenon Reactivity Worth, for plant conditions recorded in step 7.1.2 using PDB Figure 1.6.3, Xenon Worth after Trip, or RHOBAL Program.

7.1.3.3.2 Determine current HZP Inverse Boron Worth, using current EFPD the PDB Figure 1.4.1, HZP Inverse Boron Worth vs. Burnup.

7.1.3.3.3 Using temperature from step 7.1.2.5, Determine current Normalized Boron Worth from PDB Figure 1.4.2, Boron Worth Versus Moderator Temperature Normalized to 541°F.

7.1.3.3.3.1 Use 541°F for moderator temperature if plant is in Mode 1 or 2.

7.1.3.3.4 Using formula on Attachment 10.1, Calculate Xenon Equivalent Boron Concentration.

NOTE

Application of the 1.08 multiplier to Shutdown Margin is only required when the RCS is on natural circulation and boron equalization is not possible. **[ER-01-0391]**

7.1.3.4 Using formula on Attachment 10.1, Calculate Required Shutdown Margin Boron Concentration.

7.1.3.4.1 If the RCS is on natural circulation and boron equalization is not possible, then multiply the Required Shutdown Margin Boron Concentration by 1.08.

7.1.4 Verify Shutdown Margin meets requirements of Technical Specifications by verifying current RCS Boron Concentration (step 7.1.2.4) is ≥ Required Shutdown Margin Boron Concentration (step 7.1.3.4).

7.1.5 If Shutdown Margin does not meet requirements of Technical Specifications, then Commence Emergency Boration and go to OP-901-103, Emergency Boration.

NOTE

Step 7.1.6 verifies required Shutdown Margin for the next 24 hours will be met while Xenon is decaying after Shutdown. Step 7.1.6 is not applicable 72 hours after Reactor Shutdown.

7.1.6 If the Reactor has been shutdown less than 72 hours, then determine Boron Concentration required to meet Shutdown Margin for the next 24 hours and record on Attachment 10.1 as follows: **[P-20468]**

NOTE

Xenon is considered at "equilibrium" when Reactor Power has remained in a ± 1% RTP band for at least 36 hours.

CAUTION

IF REACTOR TRIP OCCURS DURING NON-EQUILIBRIUM XENON CONDITION, RHOBAL PROGRAM DATA SHALL BE USED TO DETERMINE TRANSIENT XENON WORTH FOR THE NEXT 72 HOURS.

7.1.6.1 Determine Xenon Equivalent Boron Concentration for 24 hours from present as follows:

7.1.6.1.1 Determine Xenon Reactivity Worth 24 hours from present time using PDB Figure 1.6.3, Xenon Worth after Trip or RHOBAL Program.

7.1.6.1.2 Obtain HZP Inverse Boron Worth from Step 7.1.3.3.2 .

7.1.6.1.3 Obtain Normalized Boron Worth from Step 7.1.3.3.3.

7.1.6.1.4 Using Formula on Attachment 10.1, Calculate Xenon Equivalent Boron Concentration required to meet Shutdown Margin for the next 24 hour period.

NOTE

Application of the 1.08 multiplier to Shutdown Margin is only required when the RCS is on natural circulation and boron equalization is not possible. **[ER-01-0391]**

7.1.6.2 Using formula on Attachment 10.1, calculate Required Shutdown Margin Boron Concentration.

7.1.6.2.1 If the RCS is on natural circulation and boron equalization is not possible, then multiply the Required Shutdown Margin Boron Concentration by 1.08.

7.1.6.3 Verify Shutdown Margin will be met for the next 24 hours by verifying current RCS Boron Concentration (step 7.1.2.4) is ≥ Required Shutdown Margin Boron Concentration for the next 24 hours as calculated in step 7.1.6.2.

7.1.6.4 If RCS Boron Concentration is less than the Required Shutdown Margin Boron Concentration needed for the next 24 hours, then **Borate** the RCS equal to or greater than the Required Shutdown Margin Boron Concentration in accordance with OP-002-005, Chemical and Volume Control.

7.1.6.4.1 Document the date and time the RCS was completed borated to meet the Required Shutdown Margin Boron Concentration requirements for the next 24 hours on Attachment 10.1. [N/A this step if the answer to step 7.1.6.3 was yes]

10.1 SHUTDOWN MARGIN VERIFICATION WORK SHEET - CEAS INSERTED

(Typical)

7.1.2 PLANT DATA

Step	Description	Value	Units
7.1.2.1	DATE AND TIME		
7.1.2.2	PLANT MODE		
7.1.2.3	CYCLE BURNUP (POINT ID C24110 OR EQUIVALENT)		EFPD
7.1.2.4	RCS BORON CONCENTRATION		PPM
7.1.2.5	Tave		^{o}F
7.1.2.6	DURATION OF SHUTDOWN		HR(s)
7.1.2.7	CEA POSITION		

7.1.3 REQUIRED SHUTDOWN MARGIN BORON CONCENTRATION

7.1.3.1 XENON FREE SHUTDOWN MARGIN BORON CONCENTRATION

$$\text{step 7.1.3.1.1 (\quad)} + \left[\frac{\text{step 7.1.3.1.2 (\quad) X step 7.1.3.1.3 (\quad)}}{\text{step 7.1.3.1.4 (\quad)}} \right] = _____ \text{ PPM (step 7.1.3.1.5)}$$

7.1.3.3 XENON EQUIVALENT BORON CONCENTRATION

$$\frac{\text{step 7.1.3.3.1(− \quad) X step 7.1.3.3.2 (\quad)}}{\text{step 7.1.3.3.3 (\quad)}} = − _____ \text{ PPM (step 7.1.3.3.4)}$$

7.1.3.4 REQUIRED SHUTDOWN MARGIN BORON CONCENTRATION

step 7.1.3.1.5 (_____) + step 7.1.3.3.4 (_____) = _____ PPM **(NOTE 1)**

7.1.4 SHUTDOWN MARGIN VERIFICATION

ACTUAL CONCENTRATION (STEP 7.1.2.4) ≥ REQUIRED SHUTDOWN MARGIN BORON CONCENTRATION (STEP 7.1.3.4) (circle one) YES NO

7.1.6 SHUTDOWN MARGIN VERIFICATION FOR THE NEXT 24 HOURS

7.1.6.1 XENON EQUIVALENT BORON CONCENTRATION FOR 24 HOURS FROM PRESENT

(N/A IF RX SHUTDOWN >72 HOURS)

step 7.1.6.1.1 (-) X step 7.1.6.1.2 ( ) = -_____ PPM (step 7.1.6.1.4)
step 7.1.6.1.3 ( )

7.1.6.2 REQUIRED SHUTDOWN MARGIN BORON CONCENTRATION FOR NEXT 24 HOURS

(N/A IF RX SHUTDOWN >72 HOURS)

step 7.1.3.1.5 ( ) + step 7.1.6.1.4 ( ) = _____ PPM **(NOTE 1)**

7.1.6.3 SHUTDOWN MARGIN VERIFICATION

ACTUAL CONCENTRATION (STEP 7.1.2.4) ≥ REQUIRED SHUTDOWN MARGIN BORON CONCENTRATION (STEP 7.1.6.2) (circle one) YES NO N/A

7.1.6.4.1: DATE AND TIME BORATION OF THE RCS WAS COMPLETED TO MEET REQUIRED SHUTDOWN MARGIN BORON CONCENTRATION FOR THE NEXT 24 HOURS [N/A THIS STEP IF ANSWER TO STEP 7.1.6.3 WAS YES OR N/A]

_____/_____
DATE / TIME

NOTE 1: If the RCS is on natural circulation and boron equalization is not possible, then multiply the Required Shutdown Margin Boron Concentration by 1.08.

REMARKS: _____

Performed by: _____ _____
(Signature) (Date)

Verified by: _____ _____
(Signature) (Date)

SM/CRS Review: _____ _____/_____
(Signature) (Date/Time)

11.7 CALCULATION OF PRIMARY MAKEUP WATER VOLUME FOR DIRECT DILUTION OR VCT DILUTE MAKEUP MODE

11.7.1 Check the appropriate RCS Volume (V_{RCS}) based on Reactor Power:

Reactor Power from 0 - 15%: V_{RCS} = 62,126 GAL ☐

Reactor Power from 15 - 100%: V_{RCS} = 61,421 GAL ☐

11.7.2 Record the following data:

Initial RCS Boron Concentration (C_{RCSi}): _____ PPM

Desired Final RCS Boron Concentration (C_{RCSf}): _____ PPM

11.7.3 Calculate the volume (gallons) of Primary Makeup water to be added (V_{PW}):

$$V_{PW} = V_{RCS} \times \ln\left(\frac{C_{RCSi}}{C_{RCSf}}\right)$$

$$V_{PW} = _____ \text{ GAL} \times \ln\left(\frac{_____ \text{ PPM}}{_____ \text{ PPM}}\right) = _____ \text{ GAL}$$

Performed by: _____ (Signature) _____ (Date) Verified by ①: _____ (Signature) _____ (Date)

① The independent verifier is responsible for verifying the accuracy of recorded data as well as calculations.

WSES-3 Cycle–16

Physics Data Book

Tables 1.3.4.1 and 1.3.4.2

Shutdown Boron Concentrations vs. Temperature and SDM,
Highest Worth Rod Stuck Out, No Xenon and Equilibrium Samarium*

All Other CEA's Fully Inserted

EFPD	Temp	% SDM	PPM
0.0	68	1.5	850
0.0	200	1.5	819
0.0	350	1.5	730
0.0	400	1.5	682
0.0	450	3.05	785
0.0	500	4.6	893
0.0	520	4.6	864
100	68	1.5	1032
100	200	1.5	1025
100	350	1.5	982
100	400	1.5	956
100	450	3.05	1084
100	500	4.6	1222
100	520	4.6	1204
250	68	1.5	953
250	200	1.5	930
250	350	1.5	868
250	400	1.5	834
250	450	3.05	942
250	500	4.6	1059
250	520	4.6	1038
515	68	1.5	456
515	200	1.5	422
515	350	1.5	310
515	400	1.5	248
515	450	3.05	296
515	500	4.6	342
515	520	4.6	300

*Peak samarium was assumed at zero burnup.

WSES-3 Cycle–16

Physics Data Book

Table 1.4.1

Inverse Boron Worth vs. Burnup,
HZP, Tavg = 541 °F, No Xenon and Equilibrium Samarium

(PPM / % Δρ)

PPM	<---------- EFPD ---------->								
	0.0	50	100	175	250	325	400	475	515
0	115.944	116.264	115.771	112.738	109.421	105.819	101.933	97.764	95.424
200	117.736	117.926	117.353	114.354	111.059	107.466	103.577	99.391	97.038
400	119.413	119.491	118.850	115.884	112.610	109.028	105.136	100.936	98.570
600	120.974	120.958	120.260	117.328	114.075	110.503	106.610	102.398	100.021
800	122.421	122.328	121.585	118.684	115.453	111.892	108.000	103.778	101.390
1000	123.752	123.600	122.823	119.954	116.745	113.195	109.305	105.074	102.678
1200	124.967	124.774	123.976	121.137	117.949	114.412	110.525	106.288	103.885
1400	126.068	125.851	125.042	122.234	119.068	115.543	111.660	107.418	105.010
1600	127.053	126.830	126.023	123.244	120.099	116.588	112.710	108.466	106.053
1800	127.923	127.711	126.918	124.167	121.044	117.546	113.676	109.432	107.015
2000	128.677	128.495	127.727	125.004	121.902	118.419	114.556	110.314	107.896

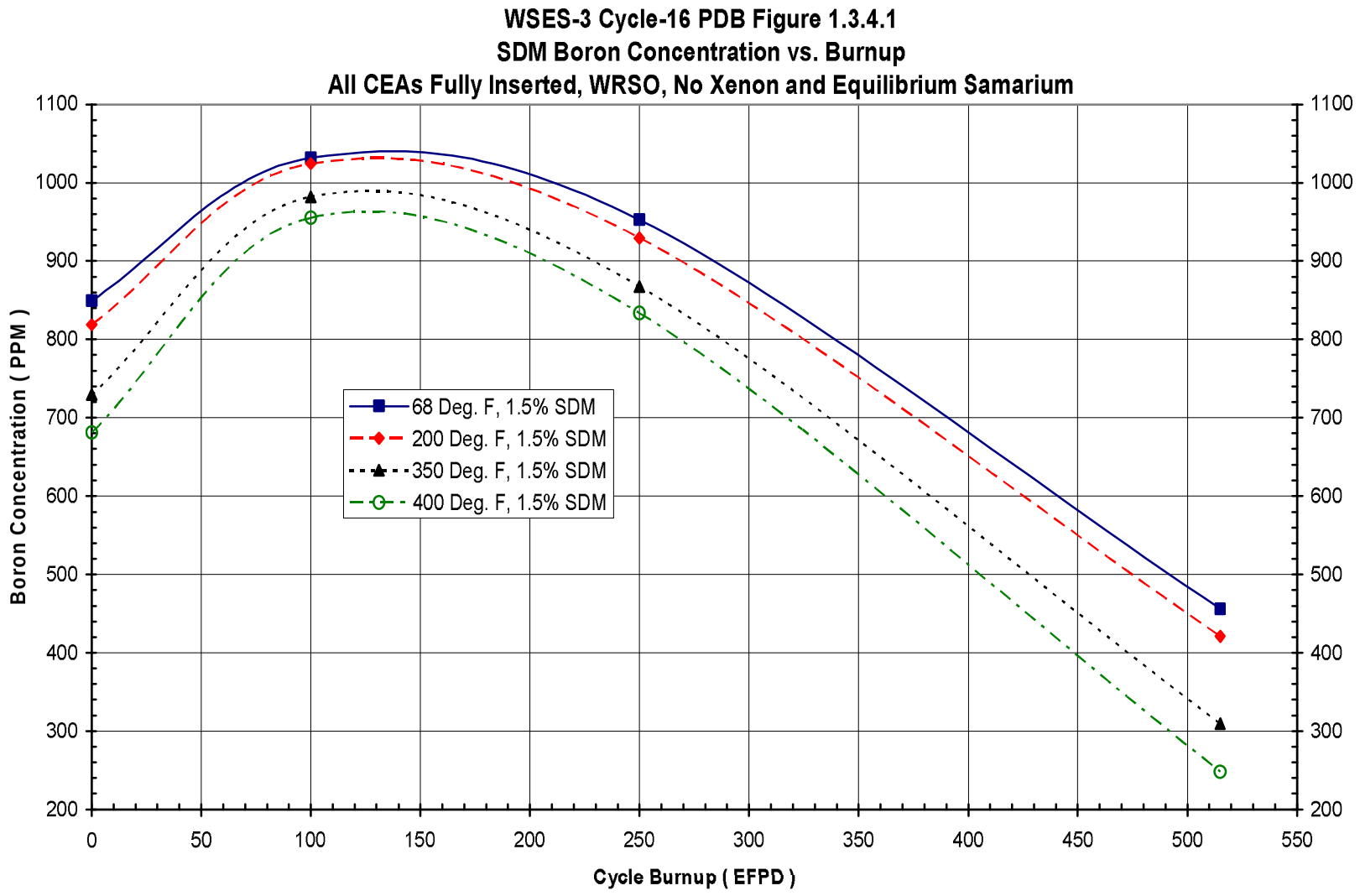
WSES-3 Cycle–16

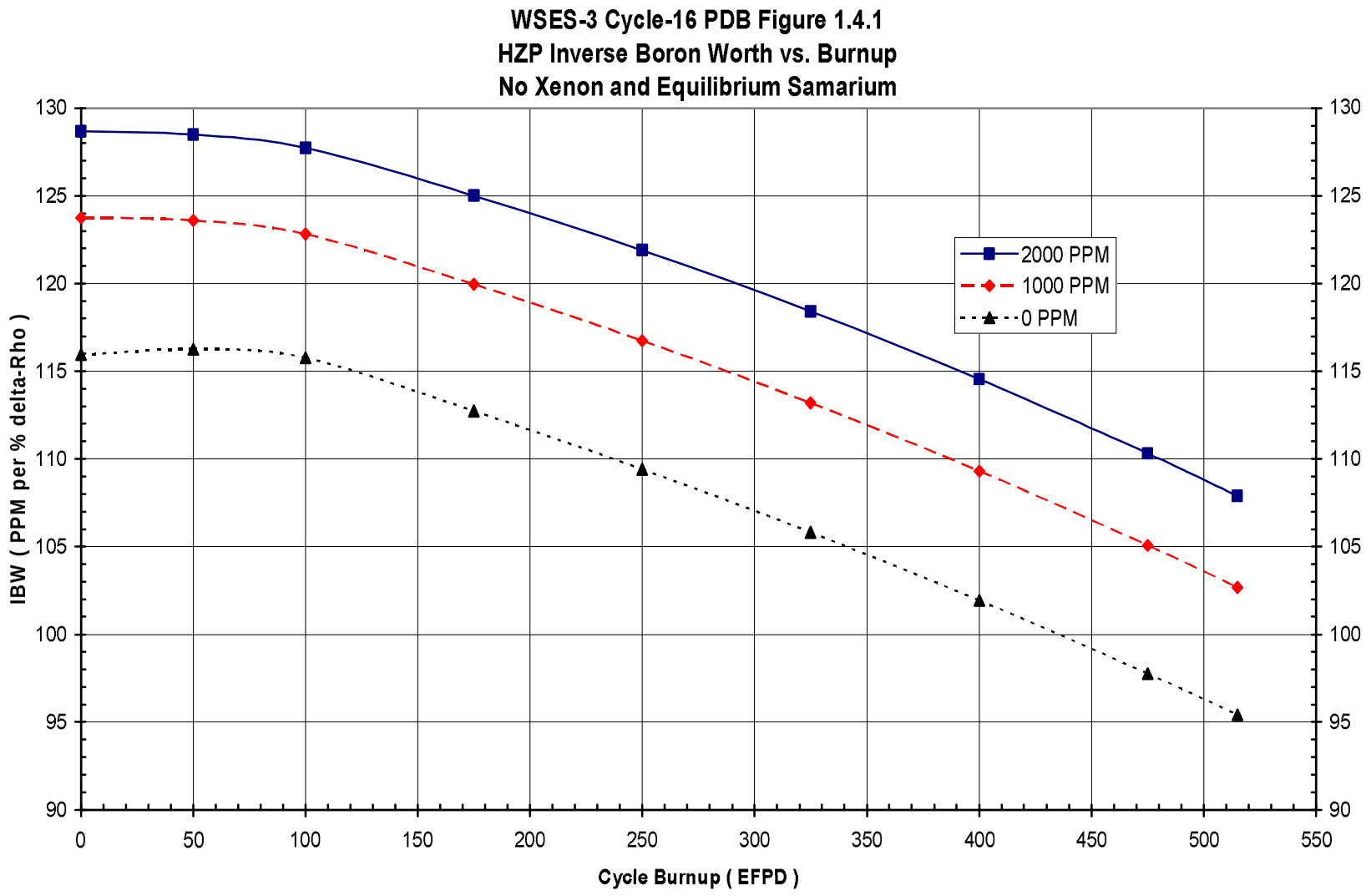
Physics Data Book

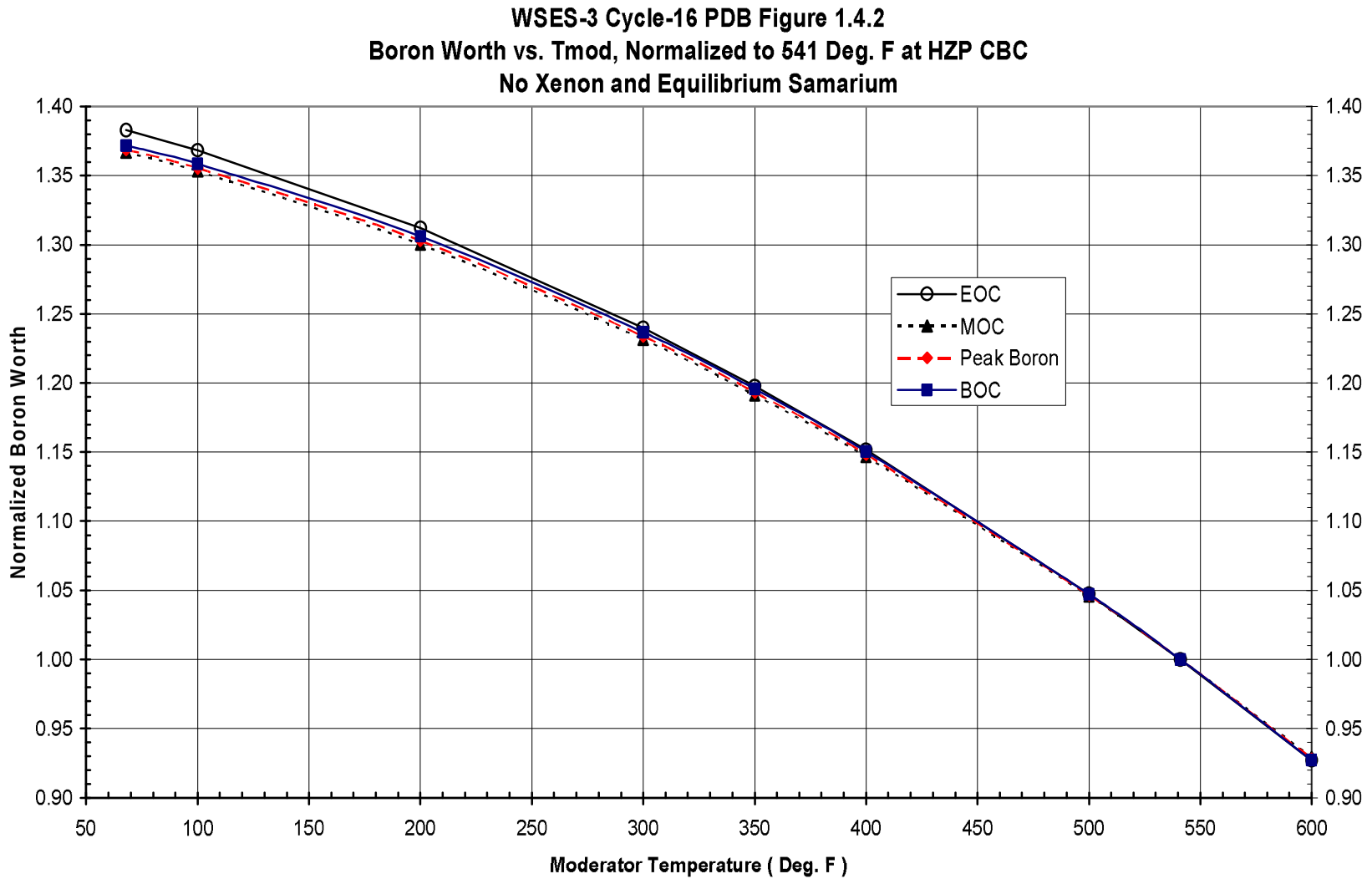
Table 1.4.2

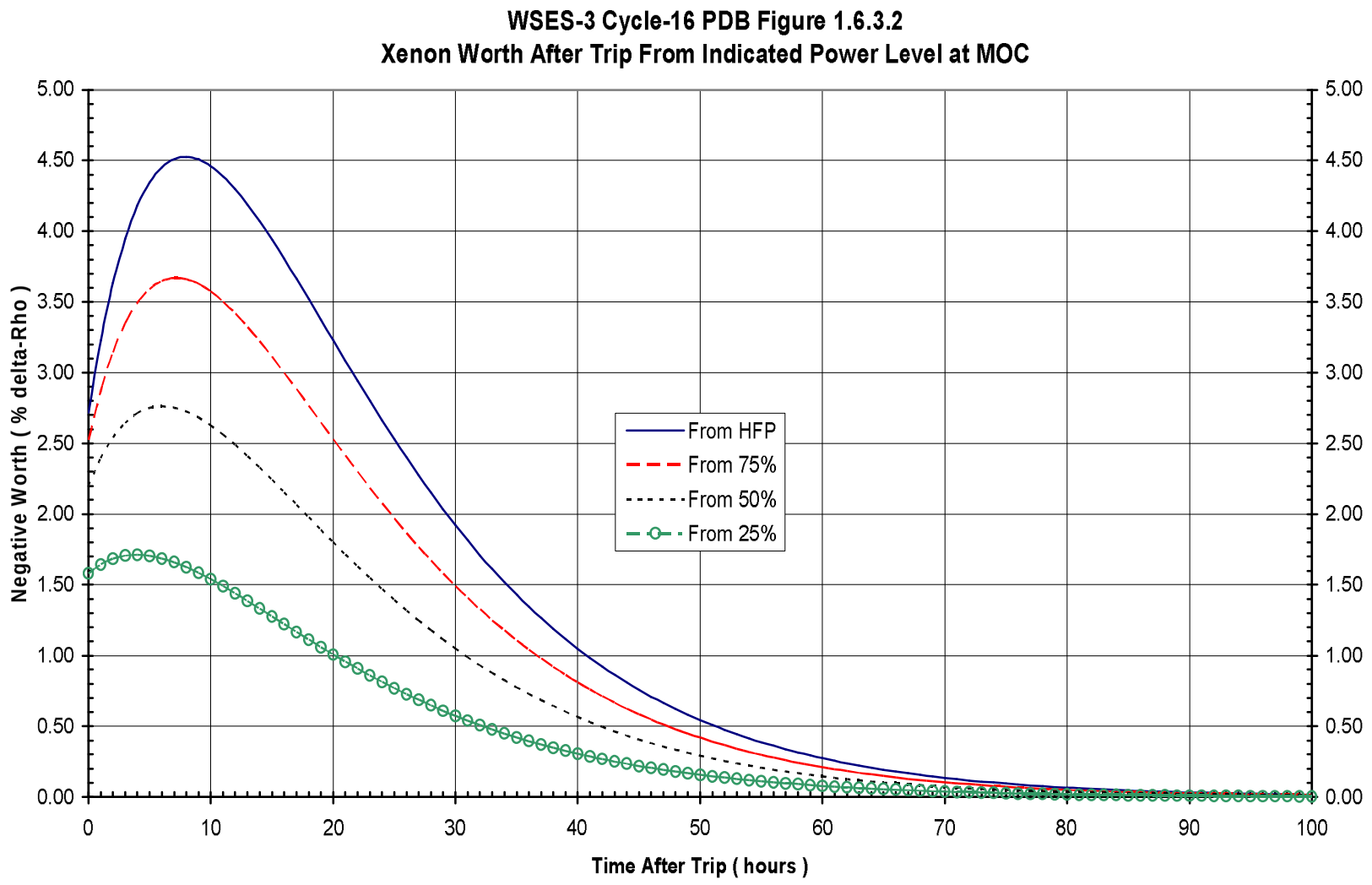
Boron Worth vs. Moderator Temperature,
Normalized to 541 °F at HZP CBC,
No Xenon and Equilibrium Samarium

Temp	**EFPD** =>	12.5	100	250	515
(Deg. F)	**PPM** =>	1339	1614	1449	611
68		1.3718	1.3688	1.3668	1.3829
100		1.3586	1.3555	1.3532	1.3683
200		1.3061	1.3029	1.3003	1.3122
300		1.2368	1.2339	1.2315	1.2400
350		1.1957	1.1932	1.1910	1.1979
400		1.1505	1.1484	1.1467	1.1517
500		1.0472	1.0465	1.0459	1.0474
541		1.0000	1.0000	1.0000	1.0000
600		0.9271	0.9282	0.9292	0.9270


WSES-3 Cycle-16 PDB Figure 1.3.4.1
SDM Boron Concentration vs. Burnup
All CEAs Fully Inserted, WRSO, No Xenon and Equilibrium Samarium
Boron Concentration (PPM)
Cycle Burnup (EFPD)
68 Deg. F, 1.5% SDM
200 Deg. F, 1.5% SDM
350 Deg. F, 1.5% SDM
400 Deg. F, 1.5% SDM
1100
1000
900
800
700
600
500
400
300
200
0
50
100
150
200
250
300
350
400
450
500
550


WSES-3 Cycle-16 PDB Figure 1.4.1
HZP Inverse Boron Worth vs. Burnup
No Xenon and Equilibrium Samarium
IBW (PPM per % delta-Rho)
Cycle Burnup (EFPD)
2000 PPM
1000 PPM
0 PPM
130
125
120
115
110
105
100
95
90
0
50
100
150
200
250
300
350
400
450
500
550


WSES-3 Cycle-16 PDB Figure 1.4.2
Boron Worth vs. Tmod, Normalized to 541 Deg. F at HZP CBC
No Xenon and Equilibrium Samarium
Normalized Boron Worth
Moderator Temperature (Deg. F)
EOC
MOC
Peak Boron
BOC
1.40
1.35
1.30
1.25
1.20
1.15
1.10
1.05
1.00
0.95
0.90
50
100
150
200
250
300
350
400
450
500
550
600


WSES-3 Cycle-16 PDB Figure 1.6.3.2
Xenon Worth After Trip From Indicated Power Level at MOC
Negative Worth (% delta-Rho)
Time After Trip (hours)
From HFP
From 75%
From 50%
From 25%
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
0
10
20
30
40
50
60
70
80
90
100

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2009 NRC Exam

JOB PERFORMANCE MEASURE

A2

Complete OP-004-005, Core Operating Limits Supervisory System Operation, Attachment 11.6, Calculation of Charging and Letdown Parameters

Applicant: _____

Examiner: _____

JOB PERFORMANCE MEASURE
DATA PAGE

Task: Complete OP-004-005, Core Operating Limits Supervisory System Operation, Attachment 11.6, Calculation of Charging and Letdown Parameters

Task Standard: Applicant correctly calculates new values for COLSS constants for Charging Enthalpy, Charging Flow, Letdown Enthalpy, Letdown Specific Volume, and Letdown Flow.

References: OP-004-005, Core Operating Limits Supervisory System Operation

Validation Time: 20 minutes Time Critical: No

Alternate Path: No

Applicant: _____

Time Start: _____ Time Finish: _____

Performance Time: _____ minutes

Performance Rating: SAT UNSAT

Comments: _____

_____

_____

_____

_____

Examiner: _____ Date: _____
Signature

EXAMINER COPY ONLY

Tools/Equipment/Procedures Needed:

OP-004-005, Core Operating Limits Supervisory System Operation, Attachment 11.6, Calculation of Charging and Letdown Parameters

Description:
This administrative JPM is run as a static simulator JPM. The applicants will gather data from the PMC to complete the Charging and Letdown calculations for the responsible COLSS constants. Any PMC terminal in the simulator can access the PMC portion of this JPM.

READ TO APPLICANT

DIRECTION TO APPLICANT:

Each administrative JPM has a cue sheet with the instructions for that JPM. Each administrative JPM stands alone, and conditions from 1 JPM do not carry over to any other JPM. If you have any questions, raise your hand and I will come to your desk.

Provide all answers on the sheets provided.

Instructions on applicant's cue sheet

The following plant conditions exist:

- The Plant is at 100% power
- RCS pressure is 2250 PSIA
- All other parameters are as displayed on the PMC
- A second Charging Pump has been started

The CRS has directed you to complete OP-004-005, Core Operating Limits Supervisory System Operation, Attachment 11.6, Calculation of Charging and Letdown Parameters, steps 11.6.1 and 11.6.2.

Use a PMC terminal as directed by the lead examiner to gather necessary data not provided on this sheet.

TASK ELEMENT	STANDARD
Record the following data: • Charging Flow C26245 • Charging Temperature A39103 • Charging Pump Discharge Temperature A39102 • RCS Loop 2B T Cold A12120	Data is obtained from the simulator PMC.
Comment: Plant Power and RCS Pressure are included on Attachment 11.6.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Perform the following calculations: 11.6.2.1 Charging Enthalpy	Calculation completed in accordance with key.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Perform the following calculations: 11.6.2.2 Charging Flow	Calculation completed in accordance with key.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Perform the following calculations: 11.6.2.3 Letdown Enthalpy	Calculation completed in accordance with key.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Perform the following calculations: 11.6.2.4 Letdown Specific Volume	Calculation completed in accordance with key.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Perform the following calculations: 11.6.2.5 Letdown Flow	Calculation completed in accordance with key.
Comment:	**Critical** **SAT / UNSAT**

END OF TASK

APPLICANT CUE SHEET

(TO BE RETURNED TO EXAMINER TO UPON COMPLETION OF TASK)

The following plant conditions exist:

- The Plant is at 100% power
- RCS pressure is 2250 PSIA
- All other parameters are as displayed on the PMC
- A second Charging Pump has been started

The CRS has directed you to complete OP-004-005, Core Operating Limits Supervisory System Operation, Attachment 11.6, Calculation of Charging and Letdown Parameters, steps 11.6.1 and 11.6.2.

Use a PMC terminal as directed by the lead examiner to gather necessary data **not provided** on this sheet.

11.6 CALCULATION OF CHARGING AND LETDOWN PARAMETERS

(typical)

Plant Power 100 %

NOTE

If PMC point is not available, then use alternate indication and document indications used in Remarks.

11.6.1 Record the following data:

STEP	PARAMETER	PMC PID	VALUE	UNITS
11.6.1.1	RCS Pressure	A12205	2250	PSIA
11.6.1.2	Charging Flow	C26245		GPM
11.6.1.3	Charging Temperature	A39103		°F
11.6.1.4	Charging Pump Discharge Temperature	A39102		°F
11.6.1.5	RCS Loop 2B T Cold	A12120		°F

11.6.2 Perform the following calculations:

11.6.2.1 Charging Enthalpy (K24215) = [1.0705 x (Step 11.6.1.3)] – 50.765 = _____ BTU/lbm

11.6.2.2 Charging Flow (K24214) = $\frac{\text{(Step 11.6.1.2) x 8.02}}{\text{.015615 + [0.000004 x (Step 11.6.1.4)]}}$ = _____ lbm/hr

11.6.2.3 Letdown Enthalpy (K24203) = [1.2555 x (Step 11.6.1.5)] – 143.37 = _____ BTU/lbm

11.6.2.4 Letdown Specific Volume = .004285 + [0.000031 x (Step 11.6.1.5)] = _____ ft^3/lbm

11.6.2.5 Letdown Flow (K24202) = (Step 11.6.2.2) = _____ lbm/hr

11.6 CALCULATION OF CHARGING AND LETDOWN PARAMETERS

(typical)

Plant Power 100 %

* JPM A2 Key *

NOTE

If PMC point is not available, then use alternate indication and document indications used in Remarks.

11.6.1 Record the following data:

STEP	PARAMETER	PMC PID	VALUE	UNITS
11.6.1.1	RCS Pressure	A12205	2250	PSIA
11.6.1.2	Charging Flow	C26245	87.7	GPM
11.6.1.3	Charging Temperature	A39103	324.4	°F
11.6.1.4	Charging Pump Discharge Temperature	A39102	118.5	°F
11.6.1.5	RCS Loop 2B T Cold	A12120	542.6	°F

11.6.2 Perform the following calculations:

11.6.2.1 Charging Enthalpy (K24215) = [1.0705 x (Step 11.6.1.3)] – 50.765 = 296.5 BTU/lbm

11.6.2.2 Charging Flow (K24214) = $\frac{\text{(Step 11.6.1.2) x 8.02}}{\text{.015615 + [0.000004 x (Step 11.6.1.4)]}}$ = 43,716.5 lbm/hr

11.6.2.3 Letdown Enthalpy (K24203) = [1.2555 x (Step 11.6.1.5)] – 143.37 = 537.9 BTU/lbm

11.6.2.4 Letdown Specific Volume = .004285 + [0.000031 x (Step 11.6.1.5)] = 0.0211 ft^3/lbm

11.6.2.5 Letdown Flow (K24202) = (Step 11.6.2.2) = 43,716.5 lbm/hr

6.2 CHANGING COLSS CONSTANTS

NOTE

(1) The following active documents are maintained by SM/CRS in the CPC and COLSS Constant Log Book:
- Attachment 11.2, COLSS Point Change Log
- Attachment 11.6, Calculation of Charging and Letdown Parameters
- Attachment 11.7, Changing Blowdown Flow Rate Constants

(2) Following a PMC failure, changes which return constants to their pre-failure values are not required to be logged on Attachment 11.2.

(3) Points K24228 and K24235 are default constants for Steam Generator Blowdown flow. COLSS automatically utilizes a conservative default value if the active point for blowdown flow should go bad. Therefore, Points K24228 and K24235 should not be updated when changes to blowdown flow are made. If changing these constants is desired, then change them in accordance with Attachment 11.7.

6.2.1 If Charging and Letdown parameters or Blowdown Flow rates are to be changed, then determine the value to be inserted in accordance with Attachment 11.6, Calculation of Charging and Letdown Parameters, or Attachment 11.7, Changing Blowdown Flow Rate Constants, as appropriate.

6.2.2 Obtain SM/CRS permission to perform this section and document authorization on Attachment 11.2.

6.2.3 Display the COLSS Main Menu by using the menu display or by pressing the COLSS key.

NOTE

The password will not appear on the screen nor will any indication of the typing.

6.2.4 Select COLSS Update Constants by using the menu display.

6.2.5 On the Password screen, type Password "COLS".

6.2.6 Press Return key.

6.2.7 Press F1 to acknowledge.

6.2.8 When the COLSS Update Constants list appears, then press function key F5 (Load CVT), to load last updated values from the database.

11.6 CALCULATION OF CHARGING AND LETDOWN PARAMETERS

(typical)
Plant Power _____%

NOTE

If PMC point is not available, then use alternate indication and document indications used in Remarks.

11.6.1 Record the following data:

STEP	PARAMETER	PMC PID	VALUE	UNITS
11.6.1.1	RCS Pressure	A12205		PSIA
11.6.1.2	Charging Flow	C26245		GPM
11.6.1.3	Charging Temperature	A39103		°F
11.6.1.4	Charging Pump Discharge Temperature	A39102		°F
11.6.1.5	RCS Loop 2B T Cold	A12120		°F

11.6.2 Perform the following calculations:

11.6.2.1 Charging Enthalpy (K24215) = [1.0705 x (Step 11.6.1.3)] – 50.765 = _____ BTU/lbm

11.6.2.2 Charging Flow (K24214) = $\frac{\text{(Step 11.6.1.2) x 8.02}}{\text{.015615 + [0.000004 x (Step 11.6.1.4)]}}$ = _____ lbm/hr

11.6.2.3 Letdown Enthalpy (K24203) = [1.2555 x (Step 11.6.1.5)] – 143.37 = _____ BTU/lbm

11.6.2.4 Letdown Specific Volume = .004285 + [0.000031 x (Step 11.6.1.5)] = _____ ft^3/lbm

11.6.2.5 Letdown Flow (K24202) = (Step 11.6.2.2) = _____ lbm/hr

NOTE

Letdown Flow is set equal to Charging Flow in order to compensate for energy removed by the Controlled Bleed Off flow from the RCP Seals.

11.6.3 Enter changes using Section 6.2, Changing COLSS Constants.

11.6.4 Complete documentation on this attachment.

11.6.5 Transmit completed attachment in accordance with OI-012-000, Control of Operating Records.

REMARKS: _____

_____

_____

_____

_____

_____

Calculations performed by: _____ _____
(Signature) (Date)

SM/CRS Review: _____ _____/_____
(Signature) (Date/Time)

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JOB PERFORMANCE MEASURE

A3

Complete Surveillance OP-903-008, Reactor Coolant System Isolation Leakage Test, Attachment 10.11 for SI-329 A

Applicant: _____

Examiner: _____

JOB PERFORMANCE MEASURE
DATA PAGE

Task: Complete Surveillance OP-903-008, Reactor Coolant System Isolation Leakage Test, Attachment 10.11 for SI-329 A

Task Standard: Applicant correctly calculates the leakage for SI-329 A using Attachment 10.11.

References: OP-903-008, Reactor Coolant System Isolation Leakage Test

Validation Time: 15 minutes Time Critical: No

Alternate Path: No

Applicant: _____

Time Start: _____ Time Finish: _____

Performance Time: _____ minutes

Performance Rating: SAT UNSAT

Comments: _____

_____

_____

_____

_____

Examiner: _____ Date: _____
Signature

EXAMINER COPY ONLY

Tools/Equipment/Procedures Needed:

OP-903-008, Attachment 10.11
OP-903-008, Section 7.11.8.

Description:
This administrative JPM is run as a static simulator JPM. The applicants will gather data from the PMC and instruments on CP-8 to complete the test on SI-329 A. Although any PMC terminal in the simulator can access the PMC portion of this JPM, the applicants will require access to CP-8, so only 1 applicant can gather data at a time.

READ TO APPLICANT

DIRECTION TO APPLICANT:

Each administrative JPM has a cue sheet with the instructions for that JPM. Each administrative JPM stands alone, and conditions from 1 JPM do not carry over to any other JPM. If you have any questions, raise your hand and I will come to your desk.

Provide all answers on the sheets provided.

Instructions on applicant's cue sheet

OP-903-008, Reactor Coolant System Isolation Leakage Test, is in progress.

- Currently, SI-329 A, Safety Injection Tank 1A Outlet Check, is being tested.
- Steps 7.11.1 through 7.11.8.10.1 have been completed.
- Another operator has recorded the initial data and entered it on Attachment 10.11, Safety Injection Tank Outlet Check Valves Leak Rate Data.

Using the necessary instruments at CP-8 and the PMC terminal at CP-35, complete step 7.11.8.10.2 and 7.11.8.11 on the provided Attachment 10.11.

Note: The final stop time and millivolt value for SIT 1A level has been provided on Attachment 10.11.

TASK ELEMENT	STANDARD
Record the following on Attachment 10.11, Safety Injection Tank Outlet Check Valves Leak Rate Data: • Stop Time • Elapsed Time • Final SI Loop 1A Leak Detection Pressure (PMC PID A43006) • Final SIT 1A Pressure (SI-IPI-0311, SI-IPI-0312 or SI-IPI-0313) • Final millivolt value of SIT 1A Level (PMC PID A44101 or A44102) • Final DP (Final SI Loop 1A Leak Detection Pressure minus Final SIT 1A Pressure)	Data has been recorded from the PMC and CP-8.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Calculate Corrected Leak Rate for Safety Injection Tank 1A Outlet Check, SI-329A, on Attachment 10.11 Safety Injection Tank Outlet Check Valves Leak Rate Data, for Gross Leak Rate.	Applicant calculated Gross Leak Rate.
Comment: See A3 Key. Gross Leak Rate = 0.157.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Calculate Corrected Leak Rate for Safety Injection Tank 1A Outlet Check, SI-329A, on Attachment 10.11 Safety Injection Tank Outlet Check Valves Leak Rate Data, for Extrapolation Ratio Coefficient.	Applicant calculated Extrapolation Ratio Coefficient.
Comment: See A3 Key. Extrapolation Ratio Coefficient = 1.495.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Calculate Corrected Leak Rate for Safety Injection Tank 1A Outlet Check, SI-329A, on Attachment 10.11 Safety Injection Tank Outlet Check Valves Leak Rate Data, for Corrected Leak Rate.	Applicant calculated Corrected Leak Rate.
Comment: See A3 Key. Corrected Leak Rate = 0.235.	**Critical** **SAT / UNSAT**

END OF TASK

APPLICANT CUE SHEET

(TO BE RETURNED TO EXAMINER TO UPON COMPLETION OF TASK)

OP-903-008, Reactor Coolant System Isolation Leakage Test, is in progress.

- Currently, SI-329 A, Safety Injection Tank 1A Outlet Check, is being tested.
- Steps 7.11.1 through 7.11.8.10.1 have been completed.
- Another operator has recorded the initial data and entered it on Attachment 10.11, Safety Injection Tank Outlet Check Valves Leak Rate Data.

Using the necessary instruments at CP-8 and the PMC terminal at CP-35, complete step 7.11.8.10.2 and 7.11.8.11 on the provided Attachment 10.11.

Note: The final stop time and millivolt value for SIT 1A level has been provided on Attachment 10.11.

CAUTION

RCS PRESSURE MUST BE AT LEAST 50 PSIG GREATER THAN SAFETY INJECTION TANK 1A PRESSURE TO OPEN SAFETY INJECTION TANK 1A OUTLET ISOLATION, SI-331A.

7.11.8.7 Verify Safety Injection Tank 1A Outlet Isolation, SI-331A, Open.

7.11.8.8 Record the following on Attachment 10.11, Safety Injection Tank Outlet Check Valves Leak Rate Data:

- Initial SI Loop 1A Leak Detection Pressure (PMC PID A43006)
- Initial SIT 1A Pressure (SI-IPI-0311, SI-IPI-0312 or SI-IPI-0313)
- Initial millivolt value of SIT 1A Level (PMC PID A44101 or A44102)
- Initial ΔP (Initial SI Loop 1A Leak Detection Pressure minus Initial SIT 1A Pressure)
- Start Time

7.11.8.9 When either of the following criteria are met, then go to step 7.11.8.10:

- Corrected Leak Rate will calculate to ≤1 GPM at any point between 20 minutes and 120 minutes elapsed time.

  OR

- 120 minutes have elapsed, or at any point between 20 minutes and 120 minutes elapsed time that it becomes apparent that Corrected Leak Rate will not calculate to ≤1 GPM by the time 120 minutes have elapsed

7.11.8.10 Perform the following:

7.11.8.10.1 Verify Safety Injection Tank 1A Leakage Drain, SI-303A, Closed.

7.11.8.10.2 Record the following on Attachment 10.11, Safety Injection Tank Outlet Check Valves Leak Rate Data:

- Stop Time
- Elapsed Time
- Final SI Loop 1A Leak Detection Pressure (PMC PID A43006)
- Final SIT 1A Pressure (SI-IPI-0311, SI-IPI-0312 or SI-IPI-0313)
- Final millivolt value of SIT 1A Level (PMC PID A44101 or A44102)
- Final ΔP (Final SI Loop 1A Leak Detection Pressure minus Final SIT 1A Pressure)

7.11.8.11 Calculate Corrected Leak Rate for Safety Injection Tank 1A Outlet Check, SI-329A, on Attachment 10.11 Safety Injection Tank Outlet Check Valves Leak Rate Data.

7.11.8.12 Verify Safety Injection Tank 1A OPERABLE in accordance with Technical Specification 3.5.1.

7.11.8.13 Record test results on Attachment 10.12, Results Summary Table.

7.11.8.14 Close HPSI Header A to RC Loop 1A Flow Control, SI-225A.

NOTE

Steps 7.11.1 through 7.11.7 must be performed prior to testing Safety Injection Tank 1B Outlet Check, SI-329B.

CAUTION

IF DURING THE LEAK TEST OF SAFETY INJECTION TANK 1B OUTLET CHECK, SI-329B, SAFETY INJECTION TANK 1B LEVEL RISES ≥ 1%, THEN TECHNICAL SPECIFICATION 3.5.1 MUST BE COMPLIED WITH.

7.11.9 To test Safety Injection Tank 1B Outlet Check, SI-329B, perform the following:

7.11.9.1 Verify Safety Injection Tank 1B level is on scale.

7.11.9.2 Verify the following valves Closed:

- SI-138B LPSI Header To RC Loop 1B Flow Control
- SI-226B HPSI Header B To RC Loop 1B Flow Control

7.11.9.3 If Hot Leg Injection Train A is being used, then Open RC Loop 1 Hot Leg Injection Leakage Drain, SI-301.

7.11.9.4 If Hot Leg Injection Train B is being used, then Open RC Loop 2 Hot Leg Injection Leakage Drain, SI-302.

7.11.9.5 If cold leg injection is being used, then Open HPSI Header A to RC Loop 1B Flow Control, SI-226A.

10.11 SAFETY INJECTION TANK OUTLET CHECK VALVES LEAK RATE DATA

Step No.		
7.11.2	**SI-329A Test Permission**:	
	CR Supervisor	10/5/09 / 0000
	(SM/CRS Signature)	(Date/Time)
7.11.8.8	Initial SI Loop 1A Leak Detection Pressure (PMC PID A43006)	1675 PSIG
	Initial SIT 1A Pressure (SI-IPI-0311, SI-IPI-0312 or SI-IPI-0313)	625 PSIG
	Initial millivolt value SIT 1A Level (PMC PID A44101 or A44102) (MV_i)	6924
	Initial ΔP:	1050 PSID
	Start Time:	2000
7.11.8.10.2	Stop Time:	2020
	Elapsed Time (T_E):	_____ min
	Final SI Loop 1A Leak Detection Pressure (PMC PID A43006)	_____ PSIG
	Final SIT 1A Pressure (SI-IPI-0311, SI-IPI-0312 or SI-IPI-0313)	_____ PSIG
	Final millivolt value SIT 1A Level (PMC PID A44101 or A44102) (MV_f):	6935
	Final ΔP:	_____ PSID
	Lowest of Initial ΔP and Final ΔP (ΔP_L):	_____ PSID
7.11.8.11	Corrected Leak Rate Calculation for SI-329A:	

GROSS LEAK RATE (R_G):

$R_G = [.286 \times (MV_f - MV_i)] / T_E$

$R_G = [.286 \times (_____ - _____)] / T_E$

$R_G = [.286 \times (_____)] / T_E$

$R_G = [_____] / T_E$

$R_G =$ _____ gal / _____ min

$R_G =$ _____ GPM

EXTRAPOLATION RATIO COEFFICIENT (C_E): (N/A if $R_G = 0$)

$C_E = [2235 \text{ PSID} / \Delta P_L]^{0.5}$

$C_E = [2235 \text{ PSID} / _____ \text{ PSID}]^{0.5}$

$C_E = [_____]^{0.5}$

$C_E =$ _____

CORRECTED LEAK RATE (R_C):

$R_C = R_G \times C_E$

$R_C =$ _____ GPM X _____

$R_C =$ _____ GPM

			(Init)		(Init)
7.11.13	CVC-199 Locked Closed (may be N/A):	Performed:	_____	Verified:	_____
7.11.14	SI-219A and SI-219B Locked Open:	Performed:	_____	Verified:	_____

Calculations Performed by:

_____ _____/_____

(Operator or STA Signature) (Date/Time)

Calculations Verified by:

_____ _____/_____

(STA or Operator Signature) (Date/Time)

10.11 SAFETY INJECTION TANK OUTLET CHECK VALVES LEAK RATE DATA

Step No.			
7.11.2	**SI-329A Test Permission:**		
	CR Sugerson	10/5/09 / 0700	
	(SM/CRS Signature)	(Date/Time)	
7.11.8.8	Initial SI Loop 1A Leak Detection Pressure (PMC PID A43006)	1675	PSIG
	Initial SIT 1A Pressure (SI-IPI-0311, SI-IPI-0312 or SI-IPI-0313)	625	PSIG
	Initial millivolt value SIT 1A Level (PMC PID A44101 or A44102) (MV_i)	6924	
	Initial ΔP:	1050	PSID
	Start Time:	2000	
7.11.8.10.2	Stop Time:	2020	
	Elapsed Time (T_E):	20	Min
	Final SI Loop 1A Leak Detection Pressure (PMC PID A43006)	1622	PSIG
	Final SIT 1A Pressure (SI-IPI-0311, SI-IPI-0312 or SI-IPI-0313)	622	PSIG
	Final millivolt value SIT 1A Level (PMC PID A44101 or A44102) (MV_f):	6935	
	Final ΔP:	1000	PSID
	Lowest of Initial ΔP and Final ΔP (ΔP_L):	1000	PSID

7.11.8.11 Corrected Leak Rate Calculation for SI-329A:

GROSS LEAK RATE (R_G):

$R_G = [.286 \times (MV_f - MV_i)] / T_E$

$R_G = [.286 \times (\underline{6935} - \underline{6924})] / T_E$

$R_G = [.286 \times (\underline{11})] / T_E$

$R_G = [\underline{3.146}] / T_E$

$R_G = \underline{3.146}$ gal / $\underline{20}$ min

$R_G = \underline{0.157}$ GPM

EXTRAPOLATION RATIO COEFFICIENT (C_E): (N/A if $R_G = 0$)

$C_E = [2235 \text{ PSID} / \Delta P_L]^{0.5}$

$C_E = [2235 \text{ PSID} / \underline{1000} \text{ PSID}]^{0.5}$

$C_E = [\underline{2.235}]^{0.5}$

$C_E = \underline{1.495}$

CORRECTED LEAK RATE (R_C):

$R_C = R_G \times C_E$

$R_C = \underline{0.157}$ GPM X $\underline{1.495}$

$R_C = \underline{0.235}$ GPM

			(Init)		(Init)
7.11.13	CVC-199 Locked Closed (may be N/A):	Performed:		Verified:	
7.11.14	SI-219A and SI-219B Locked Open:	Performed:		Verified:	

Calculations Performed by:

_____ _____/_____

(Operator or STA Signature) (Date/Time)

Calculations Verified by:

_____ _____/_____

(STA or Operator Signature) (Date/Time)

7.11 SAFETY INJECTION TANK OUTLET CHECK VALVES LEAK RATE

CAUTION

RCS PRESSURE MUST BE <1750 PSIA TO PREVENT LIFTING SI TANK DRAIN HEADER RELIEF TO CONTAINMENT SUMP, SI-339.

7.11.1 Verify all conditions, requirements, and controls of Initial Condition 4.4 have been implemented or established.

7.11.2 Obtain permission from SM/CRS and document on applicable data sheet(s) of Attachment 10.11, Safety Injection Tank Outlet Check Valves Leak Rate Data.

7.11.3 Verify Charging and Letdown in operation with two Charging Pumps running, in accordance with OP-002-005, Chemical and Volume Control.

7.11.4 Verify the following valves Closed:

- SI-138A LPSI Header To RC Loop 2B Flow Control
- SI-138B LPSI Header To RC Loop 1B Flow Control
- SI-139A LPSI Header To RC Loop 2A Flow Control
- SI-139B LPSI Header To RC Loop 1A Flow Control
- SI-225A HPSI Header A To RC Loop 1A Flow Control
- SI-225B HPSI Header B To RC Loop 1A Flow Control
- SI-226A HPSI Header A To RC Loop 1B Flow Control
- SI-226B HPSI Header B To RC Loop 1B Flow Control
- SI-227A HPSI Header A To RC Loop 2A Flow Control
- SI-227B HPSI Header B To RC Loop 2A Flow Control
- SI-228A HPSI Header A To RC Loop 2B Flow Control
- SI-228B HPSI Header B To RC Loop 2B Flow Control
- SI-301 RC Loop 1 Hot Leg Injection Leakage Drain
- SI-302 RC Loop 2 Hot Leg Injection Leakage Drain

7.11.4 Verify the following valves Closed: (cont'd)

- SI-303A Safety Injection Tank 1A Leakage Drain
- SI-303B Safety Injection Tank 1B Leakage Drain
- SI-304A Safety Injection Tank 2A Leakage Drain
- SI-304B Safety Injection Tank 2B Leakage Drain
- SI-307A Safety Injection Tank 1A Fill/Drain
- SI-307B Safety Injection Tank 1B Fill/Drain
- SI-308A Safety Injection Tank 2A Fill/Drain
- SI-308B Safety Injection Tank 2B Fill/Drain
- SI-342 SIT Drain Header Drain To Containment Sump
- SI-343 SI Tank Drain Header To RWSP Isolation

CAUTION

REGENERATIVE HEAT EXCHANGER OUTLET TEMPERATURE SHOULD BE MONITORED WHILE CHARGING TO THE RCS VIA HPSI HEADERS. IT MAY BE NECESSARY TO THROTTLE RC LOOP 1 HOT LEG INJECTION FLOW CONTROL, SI-506A, TO MAINTAIN LETDOWN IN SERVICE.

7.11.5 If it is desired to use Hot Leg Injection Train A, then perform the following:

7.11.5.1 Verify Charging Header Cross-Connect To HPSI Header B Isolation, SI-505, Closed.

7.11.5.2 Unlock and Close HPSI Discharge Header A Orifice Bypass, SI-219A.

7.11.5.3 Unlock and Open Charging Pumps Discharge To HPSI Isolation, CVC-199.

7.11.5.4 Open the following valves:

- SI-504 Charging Header Cross-Connect To HPSI Header A Isolation
- SI-502A RC Loop 1 Hot Leg Injection Isolation
- SI-506A RC Loop 1 Hot Leg Injection Flow Control

CAUTION

REGENERATIVE HEAT EXCHANGER OUTLET TEMPERATURE SHOULD BE MONITORED WHILE CHARGING TO THE RCS VIA HPSI HEADERS. IT MAY BE NECESSARY TO THROTTLE RC LOOP 2 HOT LEG INJECTION FLOW CONTROL, SI-506B, TO MAINTAIN LETDOWN IN SERVICE.

7.11.6 If it is desired to use Hot Leg Injection Train B, then perform the following:

7.11.6.1 Verify the following valves Closed:

- SI-502B RC Loop 2 Hot Leg Injection Isolation
- SI-504 Charging Header Cross-Connect To HPSI Header A Isolation

7.11.6.2 Unlock and Close HPSI Discharge Header B Orifice Bypass, SI-219B.

7.11.6.3 Unlock and Open Charging Pumps Discharge To HPSI Isolation, CVC-199.

7.11.6.4 Open the following valves:

- SI-505 Charging Header Cross-Connect To HPSI Header B Isolation
- SI-506B RC Loop 2 Hot Leg Injection Flow Control

7.11.7 If it is desired to pressurize Safety Injection Tanks Outlet Checks using cold leg injection flow path, then perform the following:

7.11.7.1 Verify Charging Header Cross-Connect To HPSI Header B Isolation, SI-505, Closed.

7.11.7.2 Unlock and Open Charging Pumps Discharge To HPSI Isolation, CVC-199.

7.11.7.3 Open Charging Header Cross-Connect To HPSI Header A Isolation, SI-504.

7.11.7.4 Verify HPSI Discharge Header A Orifice Bypass, SI-219A, Open.

NOTE

Steps 7.11.8 through 7.11.11 may be performed concurrently and in any sequence. Steps 7.11.1 through 7.11.7 must be performed prior to testing Safety Injection Tank 1A Outlet Check, SI-329A.

CAUTION

IF DURING THE LEAK TEST OF SAFETY INJECTION TANK 1A OUTLET CHECK, SI-329A, SAFETY INJECTION TANK 1A LEVEL RISES ≥ 1%, THEN TECHNICAL SPECIFICATION 3.5.1 MUST BE COMPLIED WITH.

7.11.8 To test Safety Injection Tank 1A Outlet Check, SI-329A, perform the following:

7.11.8.1 Verify Safety Injection Tank 1A level is on scale.

7.11.8.2 Verify the following valves Closed:

- SI-139B LPSI Header To RC Loop 1A Flow Control
- SI-225B HPSI Header B To RC Loop 1A Flow Control

7.11.8.3 If Hot Leg Injection Train A is being used, then Open RC Loop 1 Hot Leg Injection Leakage Drain, SI-301.

7.11.8.4 If Hot Leg Injection Train B is being used, then Open RC Loop 2 Hot Leg Injection Leakage Drain, SI-302.

7.11.8.5 If cold leg injection is being used, then Open HPSI Header A to RC Loop 1A Flow Control, SI-225A.

NOTE

Safety Injection Header 1A pressure is monitored on Leakage Pressure Cold Leg 1A (SI-IPI-0319) indicator on CP-8.

7.11.8.6 If Hot Leg Injection Train A or B is being used, then Open Safety Injection Tank 1A Leakage Drain, SI-303A, and monitor Safety Injection Header 1A pressure.

7.11.8.6.1 When Safety Injection Header 1A pressure is approximately equal to Pressurizer Pressure, then proceed to the next step.

CAUTION

RCS PRESSURE MUST BE AT LEAST 50 PSIG GREATER THAN SAFETY INJECTION TANK 1A PRESSURE TO OPEN SAFETY INJECTION TANK 1A OUTLET ISOLATION, SI-331A.

7.11.8.7 Verify Safety Injection Tank 1A Outlet Isolation, SI-331A, Open.

7.11.8.8 Record the following on Attachment 10.11, Safety Injection Tank Outlet Check Valves Leak Rate Data:

- Initial SI Loop 1A Leak Detection Pressure (PMC PID A43006)
- Initial SIT 1A Pressure (SI-IPI-0311, SI-IPI-0312 or SI-IPI-0313)
- Initial millivolt value of SIT 1A Level (PMC PID A44101 or A44102)
- Initial ΔP (Initial SI Loop 1A Leak Detection Pressure minus Initial SIT 1A Pressure)
- Start Time

7.11.8.9 When either of the following criteria are met, then go to step 7.11.8.10:

- Corrected Leak Rate will calculate to ≤1 GPM at any point between 20 minutes and 120 minutes elapsed time.

  OR

- 120 minutes have elapsed, or at any point between 20 minutes and 120 minutes elapsed time that it becomes apparent that Corrected Leak Rate will not calculate to ≤1 GPM by the time 120 minutes have elapsed

7.11.8.10 Perform the following:

7.11.8.10.1 Verify Safety Injection Tank 1A Leakage Drain, SI-303A, Closed.

7.11.8.10.2 Record the following on Attachment 10.11, Safety Injection Tank Outlet Check Valves Leak Rate Data:

- Stop Time
- Elapsed Time
- Final SI Loop 1A Leak Detection Pressure (PMC PID A43006)
- Final SIT 1A Pressure (SI-IPI-0311, SI-IPI-0312 or SI-IPI-0313)
- Final millivolt value of SIT 1A Level (PMC PID A44101 or A44102)
- Final ΔP (Final SI Loop 1A Leak Detection Pressure minus Final SIT 1A Pressure)

7.11.8.11 Calculate Corrected Leak Rate for Safety Injection Tank 1A Outlet Check, SI-329A, on Attachment 10.11 Safety Injection Tank Outlet Check Valves Leak Rate Data.

7.11.8.12 Verify Safety Injection Tank 1A OPERABLE in accordance with Technical Specification 3.5.1.

7.11.8.13 Record test results on Attachment 10.12, Results Summary Table.

7.11.8.14 Close HPSI Header A to RC Loop 1A Flow Control, SI-225A.

NOTE

Steps 7.11.1 through 7.11.7 must be performed prior to testing Safety Injection Tank 1B Outlet Check, SI-329B.

CAUTION

IF DURING THE LEAK TEST OF SAFETY INJECTION TANK 1B OUTLET CHECK, SI-329B, SAFETY INJECTION TANK 1B LEVEL RISES ≥ 1%, THEN TECHNICAL SPECIFICATION 3.5.1 MUST BE COMPLIED WITH.

7.11.9 To test Safety Injection Tank 1B Outlet Check, SI-329B, perform the following:

7.11.9.1 Verify Safety Injection Tank 1B level is on scale.

7.11.9.2 Verify the following valves Closed:

- SI-138B LPSI Header To RC Loop 1B Flow Control
- SI-226B HPSI Header B To RC Loop 1B Flow Control

7.11.9.3 If Hot Leg Injection Train A is being used, then Open RC Loop 1 Hot Leg Injection Leakage Drain, SI-301.

7.11.9.4 If Hot Leg Injection Train B is being used, then Open RC Loop 2 Hot Leg Injection Leakage Drain, SI-302.

7.11.9.5 If cold leg injection is being used, then Open HPSI Header A to RC Loop 1B Flow Control, SI-226A.

10.11 SAFETY INJECTION TANK OUTLET CHECK VALVES LEAK RATE DATA

Step No.		
7.11.2	**SI-329A Test Permission**:	
	_____	_____/_____
	(SM/CRS Signature)	(Date/Time)
7.11.8.8	Initial SI Loop 1A Leak Detection Pressure (PMC PID A43006)	_____ PSIG
	Initial SIT 1A Pressure (SI-IPI-0311, SI-IPI-0312 or SI-IPI-0313)	_____ PSIG
	Initial millivolt value SIT 1A Level (PMC PID A44101 or A44102) (MV_i)	_____
	Initial ΔP:	_____ PSID
	Start Time:	_____
7.11.8.10.2	Stop Time:	_____
	Elapsed Time (T_E):	_____ min
	Final SI Loop 1A Leak Detection Pressure (PMC PID A43006)	_____ PSIG
	Final SIT 1A Pressure (SI-IPI-0311, SI-IPI-0312 or SI-IPI-0313)	_____ PSIG
	Final millivolt value SIT 1A Level (PMC PID A44101 or A44102) (MV_f):	_____
	Final ΔP:	_____ PSID
	Lowest of Initial ΔP and Final ΔP (ΔP_L):	_____ PSID
7.11.8.11	Corrected Leak Rate Calculation for SI-329A:	

GROSS LEAK RATE (R_G):

R_G = [.286 X (MV_f - MV_i)] / T_E

R_G = [.286 X (_____ - _____)] / T_E

R_G = [.286 X (_____)] / T_E

R_G = [_____] / T_E

R_G = _____ gal / _____ min

R_G = _____ GPM

EXTRAPOLATION RATIO COEFFICIENT (C_E): (N/A if R_G = 0)

C_E = $[2235 \text{ PSID} / \Delta P_L]^{0.5}$

C_E = $[2235 \text{ PSID} / _____ \text{ PSID}]^{0.5}$

C_E = $[_____]^{0.5}$

C_E = _____

CORRECTED LEAK RATE (R_C):

R_C = R_G X C_E

R_C = _____ GPM X _____

R_C = _____ GPM

			(Init)		(Init)
7.11.13	CVC-199 Locked Closed (may be N/A):	Performed:	_____	Verified:	_____
7.11.14	SI-219A and SI-219B Locked Open:	Performed:	_____	Verified:	_____

Calculations Performed by:

_____ _____/_____

(Operator or STA Signature) (Date/Time)

Calculations Verified by:

_____ _____/_____

(STA or Operator Signature) (Date/Time)

Waterford 3

2009 NRC Exam

JOB PERFORMANCE MEASURE

A4

Calculate Stay Times Based on Dose Rates

Applicant: _____

Examiner: _____

JOB PERFORMANCE MEASURE
DATA PAGE

Task: Calculate Stay Times Based on Dose Rates

Task Standard: Applicant correctly calculates the allowed stay time to complete the described tagout without exceeding his yearly Waterford 3 administrative radiation dose limits.

References: None

Validation Time: 10 minutes Time Critical: No

Alternate Path: No

Applicant: _____

Time Start: _____ Time Finish: _____

Performance Time: _____ minutes

Performance Rating: SAT UNSAT

Comments: _____

_____

_____

_____

_____

Examiner: _____ Date: _____
Signature

EXAMINER COPY ONLY

Tools/Equipment/Procedures Needed:

None

READ TO APPLICANT

DIRECTION TO APPLICANT:

Each administrative JPM has a cue sheet with the instructions for that JPM. Each administrative JPM stands alone, and conditions from 1 JPM do not carry over to any other JPM. If you have any questions, raise your hand and I will come to your desk.

Provide all answers on the sheets provided.

Instructions on applicant's cue sheet

You have been assigned to verify a tagout in the Regenerative Heat Exchanger Room.

- Your yearly dose to date is 1750 mrem TEDE for the year.
- The dose rate in the room is 650 mrem/hour.

Based on Waterford 3 yearly administrative limits, what is your stay time in the room?

Do all of your calculations on this sheet.

TASK ELEMENT	STANDARD
Calculate stay time based on dose rate and Waterford 3 yearly TEDE limits.	Applicant calculated the stay time as 23.0 - 23.1 minutes.
Comment: Waterford 3 administrative TEDE limit: 2000 mrem Dose for the year: 1750 mrem Remaining dose for the year: 250 mrem Time allowed in room: 250 mrem / 650 mrem/hour 0.3846 hour or 23.0 – 23.1 minutes	**Critical** **SAT / UNSAT**

END OF TASK

APPLICANT CUE SHEET

(TO BE RETURNED TO EXAMINER TO UPON COMPLETION OF TASK)

You have been assigned to verify a tagout in the Regenerative Heat Exchanger Room.

- Your yearly dose to date is 1750 mrem TEDE for the year.
- The dose rate in the room is 650 mrem/hour.

Based on Waterford 3 yearly administrative limits, what is your stay time in the room?

Do all of your calculations on this sheet.

Waterford 3

2009 NRC Exam

JOB PERFORMANCE MEASURE

A5

Verify Core Protection Calculator and Plant Protection System and Calorimetric Powers are within Limits

Applicant: _____

Examiner: _____

JOB PERFORMANCE MEASURE
DATA PAGE

Task: Verify Core Protection Calculator and Plant Protection System and Calorimetric Powers are within Limits

Task Standard: Applicant reviews completed OP-903-001 paperwork and concludes that PPS Channel D(Chnl D Actual Ex Pwr) and CPC PID 171 Channel A must be adjusted for current power level and that all 4 channels of CPC PID 177 must be adjusted prior to exceeding 80% power during power ascension.

References: OP-903-001, Technical Specification Logs

Validation Time: 15 minutes Time Critical: No

Alternate Path: No

Applicant: _____

Time Start: _____ Time Finish: _____

Performance Time: _____ minutes

Performance Rating: SAT UNSAT

Comments: _____

_____

_____

_____

_____

Examiner: _____ Date: _____
Signature

EXAMINER COPY ONLY

Tools/Equipment/Procedures Needed:

OP-903-001, Technical Specification Logs
OP-010-004, Power Operations

READ TO APPLICANT

DIRECTION TO APPLICANT:

Each administrative JPM has a cue sheet with the instructions for that JPM. Each administrative JPM stands alone, and conditions from 1 JPM do not carry over to any other JPM. If you have any questions, raise your hand and I will come to your desk.

Provide all answers on the sheets provided.

Plant conditions are as follows:

- 68% power
- Raising power to 100% following mid-cycle outage in accordance with OP-010-004, Power Operations
- Night Shift Tech Spec logs have been completed

Review the completed Linear Power Channel Calibrations of OP-903-001, Technical Specification Logs.

1. Document any necessary corrective actions for the current power level, if any.
2. Document what adjustments are necessary and at what power during power ascension to 100% power, if any.

Write your conclusions on this sheet.

TASK ELEMENT	STANDARD
Determine the status of Linear Power Channel Calibrations for the current plant conditions	Applicant determines that Channel D CP-10 DVM and CPC Channel A Cal Neutron Flux Power, CPC PID 171, must be adjusted.
Comment: The Channel D CP-10 DVM reading of 3.359 is more than -0.025 volts below Calculated Power volts at 3.386 volts. CPC A Cal. Neutron Flux Power at 67.20 % is more than -0.5 below Calculated Power at 67.72 %.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Determine what adjustments are necessary and at what power during power ascension to 100% power.	Applicant determines that CPC Thermal Power, CPC PID 177, on Channels A, B, C, and D must be adjusted before power is ≥ 80%.
Comment: All 4 Channels of CPC Thermal Power must be within 2% power of Calculated Power before power is ≥ 80%, where the allowance changes from +10% to +2%. Applicant could also state that power reading should be taken again as power nears 80% to see how far from Calculated Power they are.	**Critical** **SAT / UNSAT**

END OF TASK

APPLICANT CUE SHEET

(TO BE RETURNED TO EXAMINER TO UPON COMPLETION OF TASK)

Plant conditions are as follows:

- 68% power
- Raising power to 100% following mid-cycle outage in accordance with OP-010-004, Power Operations
- Night Shift Tech Spec logs have been completed

Review the completed Linear Power Channel Calibrations of OP-903-001, Technical Specification Logs.

3. Document any necessary corrective actions for the current power level, if any.
4. Document what adjustments are necessary and at what power during power ascension to 100% power, if any.

Write your conclusions on this sheet.

DATE 10/5/09

DESCRIPTION	NOTE	MODE	T. S.	COMP #	LIMIT	UNITS	0000	1200
Linear Power Channel Calibration:	9.0	1, >15%	4.3.1.1 Tbl 4.3-1 (2,9,10,14)					
CORE ΔT PWR BDELT	9.1	>15% <35%		C24104	N/A	%	N/A	
BSCAL Power	9.1	≥35%		C24230	N/A	%	67.72	
Heat Balance Calculated Cal Power	9.2			NE-5-201	N/A	%	N/A	
Calculated Excore Pwr	9.3			Cal Pwr÷20% / V	N/A	Volts	3.386	
Chn A Actual Ex Pwr	9.4			CP-10 DVM	N/A	Volts	3.367	
Chnl B Actual Ex Pwr	9.4			CP-10 DVM	N/A	Volts	3.401	
Chnl C Actual Ex Pwr	9.4			CP-10 DVM	N/A	Volts	3.419	
Chnl D Actual Ex Pwr	9.4			CP-10 DVM	N/A	Volts	3.359	
Compare Actual and Calculated Excore Pwr	9.5	≥80%		N/A	±0.1 Volts	√, NA	N/A	
	9.9	>15% < 80%		N/A	-.025 Volts +0.5 Volts	√, NA	✓	
CPC A Cal Ntn Flux Pwr	9.6			CPC PID 171	N/A	%	67.20	
CPC A Thermal Pwr	9.6			CPC PID 177	N/A	%	70.44	
CPC B Cal Ntn Flux Pwr	9.6			CPC PID 171	N/A	%	67.92	
CPC B Thermal Pwr	9.6			CPC PID 177	N/A	%	70.51	
CPC C Cal Ntn Flux Pwr	9.6			CPC PID 171	N/A	%	68.05	
CPC C Thermal Pwr	9.6			CPC PID 177	N/A	%	70.79	
CPC D Cal Ntn Flux Pwr	9.6			CPC PID 171	N/A	%	67.89	
CPC D Thermal Pwr	9.6			CPC PID 177	N/A	%	71.29	
Compare CPC and Calorimetric Power	9.7	≥80%		N/A	±2%	√, NA	N/A	
	9.8	>15% <80%		N/A	-0.5% to +10%	√, NA	✓	

REMARKS:

9.0 In Mode 1, >15% PWR, verify the values of plant power for all four channels of CPC and Excore Nuclear Instrumentation agree within those values listed in notes 9.5, 9.7, 9.8, and 9.9 of calorimetric power as calculated by COLSS or NE-5-201, Heat Balance Calculations, if COLSS is Inoperable. If desired, use Attachment 11.3, Linear Power Channel Calibration (Data Sheet) to record data for computing 5 minute averages, then attach documentation to this Attachment. NA all entries on Attachment 11.1 (page 14 of 37) if not in Mode 1, >15% pwr.

9.1 Use the following table for Linear Power Calibration for the specified conditions:

UFM not in service and plant is at steady state	
Reactor Power ≥35%	Secondary Calorimetric PMC PID C24230
Reactor Power <35%	BDELT PMC PID C24104
UFM not in service and plant is not at steady state	
Reactor Power ≥95%	MSBSRAW PMC PID C24631
Reactor Power <95% and ≥35%	FWBSRAW PMC PID C24630
Reactor Power <35%	BDELT PMC PID C24104
UFM in service and plant is not at steady state	
Reactor Power ≥95%	MSBSRAW PMC PID C24631
Reactor Power <95% and ≥40%	USBSRAW PMC PID C24629
Reactor Power <40% and ≥35%	FWBSRAW PMC PID C24630
Reactor Power <35%	BDELT PMC PID C24104

NOTE: Steady State can be defined as ≤ .5% power change over the last 30 minutes as indicated by PMC PID B24007 indicating "OFF".

9.2 If COLSS is Inoperable, then record Calculated Calorimetric Power as determined by applicable section of NE-5-201, Heat Balance Calculations. Attach documentation to this Attachment. NA if COLSS is Operable.

9.3 Determine the Calculated Excore Nuclear Power (in volts) by dividing the value of calorimetric power (secondary or calculated) by 20% / volt.

$$\frac{\text{Calorimetric Power \%}}{\text{20\% / volt}} = \text{volts}$$

9.4 Record the value of Excore Nuclear Power (in volts) as indicated on the PPS Test Module for each Channel by performing one of the following:

a) Position the BISTABLE SELECT Switch to Position 1

b) Position the METER INPUT SELECT Switch to INPUT

or

c) Connect DVM to voltage output taps

d) Position BISTABLE SELECT Switch to Position 1

e) Position the METER INPUT SELECT Switch to EXT DVM

then

a) Place BISTABLE SELECT Switch to OFF

9.5 If ≥ 80% RTP, then verify the value of Actual Excore Nuclear Power (in volts) is within 0.1 volts of the value of Calculated Excore Nuclear Power.

If >0.05 volts, then the applicable section of Attachment 11.10, Adjustment of CPC and Excore Nuclear Instrumentation should be performed.

If >0.1 volts, then perform applicable section of Attachment 11.10. Attach 11.10 to this Attachment.

9.6 Record the values of CPC Static Thermal Power (BDT) and CPC Calibrated Neutron Flux Power (PHICAL) for all four CPC Channels, by displaying the applicable PID on the CPC ROM.

9.7 If ≥ 80% RTP, then verify the values BDT and PHICAL are within 2% RTP of the value of Secondary Calorimetric (COLSS or Manual Heat Balance) Power. If >1% RTP, then the applicable section of Attachment 11.10, should be performed.

If >2% RTP, then perform applicable section of Attachment 11.10. Attach Attachment 11.10 to this Attachment.

9.8 If >15% RTP (Rated Thermal Power) and <80% RTP, then verify the channel BDT and PHICAL values are within -0.5% RTP to +10% RTP of the value of the appropriate calorimetric (COLSS, Manual Heat Balance, or Primary ΔT) power.

If the channel is within the limit, then do not calibrate except as required during initial power ascension following Refueling.

If the channel is greater than the high limit during initial power ascension to <80% following refueling, or anytime the channel is less than the low limit, then perform applicable section of Attachment 11.10 to adjust affected signal(s) to within 0.0% RTP to +10% RTP of the Calorimetric power.

If the channel is greater than the high limit other than during initial power ascension to <80% following refueling, then perform the following: **[CR-WF3-2006-03726]**

- Perform applicable section of Attachment 11.10 to adjust affected signal(s) to within +8.0% RTP to +10% RTP above Calorimetric power. Attach Attachment 11.10 to this Attachment.
- Initiate a Condition Report and request Reactor Engineering investigate the reason for the power difference being greater than +10%. This condition should be investigated and resolved prior to power ascension to ≥80% power. **[NF-WTFD-06-48]**

9.9 If >15% RTP and <80% RTP, then verify the value of Actual Excore Nuclear Power (in volts) is within -0.025 volts to +0.5 volts of the value of Calculated Excore Nuclear Power. If the channel is within the limit, then do not calibrate except as required during initial power ascension following Refueling. If the value is outside the limit, then perform applicable section of Attachment 11.10 to adjust affected signal(s) to within 0.0 volts to +0.5 volts of the value of Calculated Excore Nuclear Power. Attach Attachment 11.10 to this Attachment.

10.0 If Plant Monitoring Computer not available, then take readings locally.

11.0 Channel Check is between Primary and Backup Towers at the 33 ft. level.

11.1 The 199' Primary Wind Speed Channel Check shall meet as a minimum >0.134 meters/second and not constant (any indicated change within 30 minutes). Zero wind speed or a seized instrument is indicated by a constant 0.134 meters/second.

12.0 Channel Check is between similar instruments on the Primary Tower.

13.0 Channel Check is between Primary and Backup Towers at the 33 ft. level with either 33 ft. wind speed >2 meters/second.

13.1 If any 33 ft wind speed sensor is >2 meters/second, then check Primary 199 ft. wind direction is within 60° of Primary and Backup 33 ft. wind direction.

NOTE

BSCAL is not a good indication of instantaneous power during power maneuvers. Additionally, once the smoothing factor is applied at approximately 98% MSBSRAW (PMC PID C24631), BSCAL becomes a time weighted average of power recorded over approximately 20 minutes. The following tables list COLSS calculated powers available during power maneuvering to monitor instantaneous power: **[CR-WF3-2005-03985]**

UFM not in service	
Reactor Power ≥ 95%	MSBSRAW PMC PID C24631
Reactor Power < 95% and ≥ 35%	FWBSRAW PMC PID C24630
Reactor Power < 35%	BDELT PMC PID C24104

UFM in service	
Reactor Power ≥ 95%	MSBSRAW PMC PID C24631
Reactor Power < 95% and ≥ 40%	USBSRAW PMC PID C24629
Reactor Power < 40% and ≥ 35%	FWBSRAW PMC PID C24630
Reactor Power < 35%	BDELT PMC PID C24104

9.1.62 When Reactor Power is greater than 40% and prior to exceeding 50%, then place the UFM in service in accordance with OP-004-005, Core Operating Limits Supervisory System Operation. **[TRM 3.3.5]** JB / 10/5/09

9.1.63 Prior to exceeding 50% Reactor Power, Start third Condensate Pump in accordance with OP-003-003, Condensate. JB / 10/5/09

9.1.64 Prior to exceeding 50% power, verify CPC Calibrated Neutron Flux Power (CPC PID 171), CPC Thermal Power (CPC PID 177) and Actual Excore Nuclear Power (CP-10 DVM) agree with Secondary Calorimeteric Power within limits specified in OP-903-001, Technical Specification Surveillance Log. JB / 10/5/09

(Initial/Date)

9.1.65 When Reactor power is ~ 50%, then verify Feedwater Control is in Automatic and Start second Main Feedwater Pump in accordance with OP-003-033, Main Feedwater. JS / 10/5/09

9.1.66 When Reactor power exceeds 50%, then verify power escalation rate is within limits of Attachment 9.6, Fuel Preconditioning Guidelines. JS / 10/5/09

9.1.67 Prior to exceeding 60% Reactor power, perform OP-904-010, Reactor Trip on Turbine Trip Channel Functional Test for all four PPS channels, if not performed within the last 6 months. JS / 10/5/09

CAUTION

BOTH MAIN FEEDWATER PUMPS MUST BE OPERATING PRIOR TO PLACING REACTOR POWER CUTBACK IN SERVICE. **[P-13902]**

9.1.68 When Reactor power is 65%, then perform one of the following:

9.1.68.1 If Reactor Power Cutback is to be placed in service, then perform the following:

9.1.68.1.1 Verify both Main Feedwater Pumps are operating. JS / 10/5/09

9.1.68.1.2 Align Reactor Power Cutback for service in accordance with OP-004-015, Reactor Power Cutback System. JS / 10/5/09

9.1.68.2 If Reactor Power Cutback is not to be placed in service, then perform the following:

9.1.68.2.1 Enable Loss of Turbine and Loss of Load Trip functions in accordance with OP-004-015, Reactor Power Cutback System. N/A /

9.1.69 Prior to exceeding 70% reactor power, verify both ADVs in AUTO with a setpoint of 990.0 psig to 992.0 psig as indicated by PMC PIDs A08223 and A08224. **[T.S. 3.7.1.7]** JS / 10/5/09

9.1.69.1 Document on the applicable Work Order for PMRQ 10845-01. JS / 10/5/09

9.1.70 Prior to exceeding 70% reactor power, verify Containment Temperature is in compliance with Technical Specification 3.6.1.5. JS / 10/5/09

(Initial/Date)

9.1.71 When Reactor power is ~ 70%, then place Heater Drain Pumps in service in accordance with OP-003-034, Feed Heater Vents and Drains. _____/_____

9.1.72 When Reactor Power is > 70% power, then as soon as possible, but not to exceed 12 hours, verify RCS flow, as seen by each CPC channel, is < COLSS RCS flow rate in accordance with OP-903-001, Technical Specification Surveillance Logs. **[S.R. 4.3.1.1]** _____/_____

9.1.73 Prior to exceeding 80% power, verify the following agree with Secondary Calorimetric Power within limits specified in OP-903-001, Technical Specification Surveillance Log for power levels above 80%. _____/_____

- CPC Calibrated Neutron Flux Power (CPC PID 171)
- CPC Thermal Power (CPC PID 177)
- Actual Excore Nuclear Power (CP-10 DVM)

9.1.74 When Condensate Flow exceeds 21,000 gpm as indicated by PMC PID S02404, then verify OPEN CD-154, Gland Steam Condenser Bypass (PMC PID D02404). _____/_____

9.1.75 Prior to exceeding 90% power, re-evaluate CEA Subgroups selected to drop on a Reactor Power Cutback event in accordance with OP-004-015, Reactor Power Cutback System. _____/_____

NOTE

The below control bands for T_C were selected to ensure that the Technical Specification limits for T_C are maintained in accordance with Technical Specification 3.2.6 while following T_H reduction guidelines. Minor deviations to control bands are allowed at SM/CRS discretion.

9.1.76 At or above 92% power and at steady state conditions, control T_c in the following ranges:

- 0-30 EFPD 543 to 546°F
- 30-60 EFPD 543 to 545°F
- > 60 EFPD 543 to 544°F

9.1.76.1 All other times, maintain T_c 536-549°F. **[T.S. 3.2.6]**

Waterford 3

2009 NRC Exam

JOB PERFORMANCE MEASURE

A6

Review DNBR and LPD Limits Associated with OP-901-501, PMC or COLSS Malfunction

Applicant: _____

Examiner: _____

JOB PERFORMANCE MEASURE
DATA PAGE

Task: Review DNBR and LPD Limits Associated with OP-901-501, PMC or COLSS Malfunction

Task Standard: Applicant reviews completed OP-901-501 paperwork discovers errors on Attachments 2 and Attachment 3.

References: OP-901-501, PMC or COLSS Malfunction
Technical Specification 3.2.4 and COLR 3.2.4

Validation Time: 25 minutes Time Critical: No

Alternate Path: No

Applicant: _____

Time Start: _____ Time Finish: _____

Performance Time: _____ minutes

Performance Rating: SAT UNSAT

Comments: _____

_____

_____

_____

_____

Examiner: _____ Date: _____
Signature

EXAMINER COPY ONLY

Tools/Equipment/Procedures Needed:

OP-901-501, PMC or Core Operating Limit Supervisory System Malfunction

READ TO APPLICANT

DIRECTION TO APPLICANT:

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

Instructions on applicant's cue sheet

Plant conditions are as follows:

- 100% power
- Both CEACs are operable
- 250 EFPD
- Containment temperature is 102 °F

The Plant Monitoring Computer failed at 1855 on 10/5/2009.

You have entered OP-901-501, PMC or Core Operating Limit Supervisory System Malfunction.

The BOP operator has completed Attachment 1, CPC DNBR Limit Calculation, Attachment 2, CPC LPD Limit Calculation , and Attachment 3, 15 Minute Log, of OP-901-501.

He has also informed you that the plant is not in compliance with Tech Spec 3.2.4 as a result of his calculations.

Review the attached paperwork for accuracy and document any errors or discrepancies identified.

TASK ELEMENT	STANDARD
Applicant discovers that all 4 CPC LPD limits calculated on Attachment 2 were done with the calculation in step 5 vice step 4.	Corrected CPC LPD limits to 12.12, 11.91, 12.11, and 13.41 for Channels A through D.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
OP-901-501 Attachment 3 LPD limit lists correct value.	Applicant corrected the 4 CPC LPD limits on Attachment 3.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
Applicant discovers that the BOP operator filled in No for DNBR within limits of Tech Spec 3.2.4 on any operable CPC Channel.	Applicant determined Channel A and Channel B meet the limits of Tech Spec 3.2.4, using COLR figure 8A on page 3/4-2-6B.
Comment:	**Critical** **SAT / UNSAT**

END OF TASK

APPLICANT CUE SHEET

(TO BE RETURNED TO EXAMINER TO UPON COMPLETION OF TASK)

Plant conditions are as follows:

- 100% power
- Both CEACs are operable
- 250 EFPD
- Containment temperature is 102 °F

The Plant Monitoring Computer failed at 1855 on 10/5/2009.

You have entered OP-901-501, PMC or Core Operating Limit Supervisory System Malfunction.

The BOP operator has completed Attachment 1, CPC DNBR Limit Calculation, Attachment 2, CPC LPD Limit Calculation , and Attachment 3, 15 Minute Log, of OP-901-501.

He has also informed you that the plant is not in compliance with Tech Spec 3.2.4 as a result of his calculations.

Review the attached paperwork for accuracy and document any errors or discrepancies identified.

E SUBSEQUENT OPERATOR ACTIONS

E_0 GENERAL

CAUTION

CEA MOVEMENT SHOULD NOT BE ALLOWED FOR THE FIRST TWO HOURS AFTER COLSS BECOMES INOPERABLE BECAUSE THE ANALYSIS OF CPC/COLSS RATIO IS NOT LINEAR WHEN CEA'S ARE MOVED.

	PLACEKEEPER START	PLACEKEEPER DONE	PLACEKEEPER N/A
1. If CEA movement is necessary, then within 15 minutes verify LPD and DNBR are within the limits of Technical Specifications 3.2.1 and 3.2.4 on any operable CPC channel. **[P-20634, P-13445, P-13446]**	☐	Continuous ⬇	☒
1.1 If LPD or DNBR are outside the limits of 3.2.1 or 3.2.4, then perform one the following:	☐	☐	☒
• Within the next two hours, restore CPC LPD and DNBR to within limits of T.S. 3.2.1 and 3.2.4,	☐	☐	☒
or			
• Reduce Thermal Power to less than or equal to 20 % of Rated Thermal Power within the next 6 hours,	☐	☐	☒
2. If entered due to a dropped or misaligned CEA, then initiate a power reduction to comply with Technical Specification 3.1.3.1 and perform OP-901-102, CEA or CEDMS Malfunction, concurrently with this procedure.	☐	☐	☒
3. If entered due to a PMC failure then go to section E_1, Loss of COLSS/PMC.		☒	☐
4. If entered due to COLSS failure only, then go to section E_2, Loss of COLSS (PMC Available).		☐	☒

E_1 LOSS OF COLSS/PMC

NOTE

(1) CPC DNBR and LPD values are checked every 15 minutes to monitor for further degradation. An immediate power reduction is required if CPC DNBR is < or CPC LPD is > the calculated limits on any operable CPC channel. LPD and DNBR values are acceptable if within limits of Technical Specifications 3.2.1 (LPD) and 3.2.4 (DNBR) on any operable CPC channel. **[P-20634]**

(2) When a CEA drops into the core, the targeted CPC will trip. Recording data for the targeted CPC is not required and should not be accomplished due to the possibility of improperly evaluating limits on the Attachments.

	PLACEKEEPER START	PLACEKEEPER DONE	PLACEKEEPER N/A
1. If >20 % Reactor Power, then perform the following:	☒	☐	☐
1.1 Inform Shift Technical Advisor (STA) that his assistance is required in manually performing COLSS related LCO calculations.		☒	
1.2 If a power reduction is not in progress, and no CEA movement has occurred, then within 15 minutes of loss of COLSS, perform the following: **[P-20634]**	☒	☐	☐
1.2.1 Calculate CPC DNBR Limit on operable CPC channels by performing Attachment 1, CPC DNBR Limit Calculation, and document limits on Attachment 3, 15 Minute Log. **[P-13446]**	☒	☒	
1.2.2 Calculate CPC LPD Limit on operable CPC channels by performing Attachment 2, CPC LPD Limit Calculation, and document limits on Attachment 3. **[P-13445]**	☒	☒	
1.2.3 Perform Attachment 3 to verify LPD, DNBR, and ASI within limits on operable CPC channels, and every 15 minutes thereafter. **[P-13445, P-13446, P-461]**	☒	Continuous ⬇	

E_1 LOSS OF COLSS/PMC (CONT'D)

		PLACEKEEPER START	PLACEKEEPER DONE	PLACEKEEPER N/A
1.3	If a power reduction is in progress, or CEA movement has occurred, then verify the following on operable CPC channels within 15 minutes and every 2 hours thereafter: **[P-20634]**	☐	☐	☒
	• LPD within limits of Technical Specification 3.2.1 **[P-13445]**		☐	
	• DNBR within limits of Technical Specification 3.2.4 **[P-13446]**		☐	
	• ASI within limits of Technical Specification 3.2.7 **[P-461]**		☐	
1.4	If within two hours of COLSS inoperable and CPC DNBR drops below CPC DNBR Limit as calculated on Attachment 1, then immediately commence a power reduction to restore CPC DNBR to limits of T.S. 3.2.4.	☐	☐	☐
1.5	If within two hours of COLSS inoperable and CPC LPD exceeds the CPC LPD Limit as calculated on Attachment 2, then immediately commence a power reduction to restore CPC LPD to limits of T.S. 3.2.1.	☐	☐	☐
1.6	If COLSS is not restored within two hours and LPD or DNBR are outside the limits of Technical Specifications 3.2.1 and 3.2.4 as applicable, then perform the following:	☐	☐	☐
	• Within the next two hours, restore CPC LPD and DNBR to within limits of T.S. 3.2.1 and 3.2.4,	☐	☐	☐
	or			
	• Reduce Thermal Power to less than or equal to 20 % of Rated Thermal Power within the next 6 hours,	☐	☐	☐

ATTACHMENT 1: CPC DNBR LIMIT CALCULATION

1. Record CPC DNBR in column (1) and CPC PHICAL in column (3) using data from CPC's.

2. Record COLSS DNBR POL in column (2) using last valid value for COLSS DNBR POL, PMC PID C24560 as found on dedicated trend pen recorder.

3. Perform CPC DNBR Limit calculation for each CPC Channel with data from applicable column using the formula shown below. Record results in column (4).

$$[(2) - (3)] \times 0.03 = (4)$$

4. If available DNBR margin > 0.15, then perform the following calculation. Record results in column (5).

$$(1) - 0.1 = (5)$$

5. If available DNBR margin ≤ 0.15, then perform the following calculation. Record results in column (5).

$$(1) - (4) = (5)$$

Available DNBR Limit					
CPC Channel	(1) CPC DNBR PID 406	(2) COLSS DNBR POL	(3) CPC PHICAL PID 171	(4) Available Margin	(5) CPC DNBR Limit
A	2.17	109	100.7	0.249	2.07
B	2.13	109	100.5	0.255	2.03
C	2.17	109	100.5	0.255	2.07
D	2.13	109	100.9	0.243	2.03

Performed John Sigalli Date/Time 10/5/09 1905

Verified Joe Operator Date/Time 10/5/09 1913

SM/CRS _____ Date/Time _____

—Transmit with OP-903-001, Technical Specification Surveillance Logs.—

ATTACHMENT 2: CPC LPD LIMIT CALCULATION

1. Record CPC LPD in column (1) and CPC PHICAL in column (3) using data from CPC's.

2. Record COLSS KW/FT POL (2) using last valid value for COLSS KW/FT POL, PMC PID C24561 as found on dedicated trend pen recorder.

3. Perform CPC KW/FT Limit calculation for each CPC Channel with data from applicable column using the formula shown below. Record results in column (4).

$$\frac{[(2)-(3)]}{18} = (4)$$

4. If available LPD margin > 0.4, then perform the following calculation. Record results in column (5).

$$(1) + 0.25 = (5)$$

5. If available LPD margin ≤ 0.4, then perform the following calculation. Record results in column (5).

$$(1) + (4) = (5)$$

Available LPD Margin Limit					
CPC Channel	(1) CPC LPD PID 179	(2) COLSS KW/FT POL	(3) CPC PHICAL PID 171	(4) Available Margin	(5) CPC LPD Limit
A	11.87	113	100.7	0.683	12.55
B	11.66	113	100.5	0.694	12.35
C	11.86	113	100.5	0.694	12.55
D	13.16	113	100.9	0.672	13.83

Performed John Signature Date/Time 10/5/09 1900

Verified Joe Operator Date/Time 10/5/09 1910

SM/CRS _____ Date/Time _____

—Transmit with OP-903-001, Technical Specification Surveillance Logs.—

ATTACHMENT 3: 15 MINUTE LOG

[P-461, P-13445, P-13446, P-20634]

		TIME:	1915	1930			
CPC Channel A Limits	LPD PID 179		11.87	11.87			
LPD = 12.55	DNBR PID 406		2.17	2.15			
DNBR = 2.07	ASI PID 268		0.01	0.01			
CPC Channel B Limits	LPD PID 179		11.66	11.67			
LPD = 12.35	DNBR PID 406		2.13	2.12			
DNBR = 2.03	ASI PID 268		-0.02	-0.02			
CPC Channel C Limits	LPD PID 179		11.86	11.85			
LPD = 12.55	DNBR PID 406		2.10	2.06			
DNBR = 2.07	ASI PID 268		-0.005	-0.01			
CPC Channel D Limits	LPD PID 179		13.16	13.17			
LPD = 13.83	DNBR PID 406		2.07	2.04			
DNBR = 2.03	ASI PID 268		-0.01	-0.015			
CPC LPD < CPC LPD LIMIT ON ALL "OPERABLE" CPC CHANNELS (Y/N)			Y	Y			
LPD WITHIN LIMITS OF T.S. 3.2.1 ON ANY "OPERABLE" CPC CHANNEL. (Y/N) *			Y	Y			
CPC DNBR > CPC DNBR LIMIT ON ALL "OPERABLE" CPC CHANNELS (Y/N)			Y	N			
DNBR WITHIN LIMITS OF T.S. 3.2.4 ON ANY "OPERABLE" CPC CHANNEL (Y/N) **			Y	N			
ASI ACCEPTABLE (Y/N) ***			Y	Y			
PERFORMED BY (INITIALS)			JS	JS			

* IF LPD is not within the limits of T.S. 3.2.1 on any "operable" CPC Channel, then enter Technical Specification 3.2.1.
If complying with the applicable action of Technical Specification 3.6.1.5, then reduce the CPC LPD Limit of T.S. 3.2.1 as follows:

Average Containment Temperature ($T_{AVG\ CNTMT}$) as determined by OP-903-001.	Action to take to comply with Technical Specification 3.6.1.5.
$86 \leq T_{AVG\ CNTMT} < 96$	Reduce CPC LPD Limit by 0.2 kW/ft
$76 \leq T_{AVG\ CNTMT} < 86$	Reduce CPC LPD Limit by 0.4 kW/ft

** If DNBR is not within the limits of T.S. 3.2.4 on any "operable" CPC Channel, then enter Technical Specification 3.2.4.

*** ASI is acceptable IF within limits of Technical Specification 3.2.7.

Performed by: John Signorelli 10/5/09
(Signature) (Date)

SM/CRS Review: _____ ____/____
(Signature) (Date/Time)

—Transmit with OP-903-001, Technical Specification Surveillance Logs.—

ATTACHMENT 3: 15 MINUTE LOG

JPM A6 Key

[P-461, P-13445, P-13446, P-20634]

		TIME: 1915	1930	
CPC Channel A Limits LPD = 12.55 DNBR = 2.07	LPD PID 179	11.87	11.87	DNBR meets COLR figure 8A (≥ 2.11 required to meet figure)
	DNBR PID 406	2.17	2.15	
	ASI PID 268	0.01	0.01	
CPC Channel B Limits LPD = 12.35 DNBR = 2.03	LPD PID 179	11.66	11.67	DNBR meets COLR figure 8A (≥ 2.09 required to meet figure)
	DNBR PID 406	2.13	2.12	
	ASI PID 268	-0.02	-0.02	
CPC Channel C Limits LPD = 12.55 DNBR = 2.07	LPD PID 179	11.86	11.85	DNBR does not meet COLR figure 8A (≥ 2.10 required to meet figure)
	DNBR PID 406	2.10	2.06	
	ASI PID 268	-0.005	-0.01	
CPC Channel D Limits LPD = 13.83 DNBR = 2.03	LPD PID 179	13.16	13.17	DNBR does not meet COLR figure 8A (≥ 2.10 required to meet figure)
	DNBR PID 406	2.07	2.04	
	ASI PID 268	-0.01	-0.015	
CPC LPD < CPC LPD LIMIT ON ALL "OPERABLE" CPC CHANNELS (Y/N)		Y	Y	
LPD WITHIN LIMITS OF T.S. 3.2.1 ON ANY "OPERABLE" CPC CHANNEL (Y/N) *		Y	Y	
CPC DNBR > CPC DNBR LIMIT ON ALL "OPERABLE" CPC CHANNELS (Y/N)		Y	N	
DNBR WITHIN LIMITS OF T.S. 3.2.4 ON ANY "OPERABLE" CPC CHANNEL (Y/N) **		Y	N	Should be "Y"
ASI ACCEPTABLE (Y/N) ***		Y	Y	
PERFORMED BY (INITIALS)		JS	JS	

incorrect limits from Att. 2.

* IF LPD is not within the limits of T.S. 3.2.1 on any "operable" CPC Channel, then enter Technical Specification 3.2.1.
If complying with the applicable action of Technical Specification 3.6.1.5, then reduce the CPC LPD Limit of T.S. 3.2.1 as follows:

Average Containment Temperature ($T_{AVG\ CNTMT}$) as determined by OP-903-001.	Action to take to comply with Technical Specification 3.6.1.5.
$86 \le T_{AVG\ CNTMT} < 96$	Reduce CPC LPD Limit by 0.2 kW/ft
$76 \le T_{AVG\ CNTMT} < 86$	Reduce CPC LPD Limit by 0.4 kW/ft

** If DNBR is not within the limits of T.S. 3.2.4 on any "operable" CPC Channel, then enter Technical Specification 3.2.4.

*** ASI is acceptable IF within limits of Technical Specification 3.2.7.

Performed by: John Signorelli (Signature) 10/5/09 (Date)

SM/CRS Review: _____ (Signature) ___/___ (Date/Time)

—Transmit with OP-903-001, Technical Specification Surveillance Logs.—

3/4.2.4 DNBR MARGIN

LIMITING CONDITION FOR OPERATION

3.2.4 The DNBR margin shall be maintained by one of the following methods:

a. Maintaining COLSS calculated core power less than or equal to COLSS calculated core power operating limit based on DNBR (when COLSS is in service, and either one or both CEACs are operable); or

b. Maintaining COLSS calculated core power less than or equal to COLSS calculated core power operating limit based on DNBR decreased by the amount specified in the COLR (when COLSS is in service and neither CEAC is operable); or

c. Operating within the region of acceptable operation specified in the COLR using any operable CPC channel (when COLSS is out of service and either one or both CEACs are operable); or

d. Operating within the region of acceptable operation specified in the COLR using any operable CPC channel (when COLSS is out of service and neither CEAC is operable).

APPLICABILITY: MODE 1 above 20% of RATED THERMAL POWER.

ACTION:

a. With the DNBR limit not being maintained as indicated by COLSS calculated core power exceeding the COLSS calculated core power operating limit based on DNBR, within 15 minutes initiate corrective action to reduce the DNBR to within the limits and either:

   1. Restore the DNBR to within its limits within 1 hour, or

   2. Reduce THERMAL POWER to less than or equal to 20% of RATED THERMAL POWER within the next 6 hours.

b. With the DNBR limit not being maintained as indicated by operation outside the region of acceptable operation specified in the COLR with COLSS out of service, either:

   1. Restore COLSS to service within 2 hours, or

   2. Restore the DNBR to within its limits within the next 2 hours, or

   3. Reduce THERMAL POWER to less than or equal to 20% of RATED THERMAL POWER within the next 6 hours.

SURVEILLANCE REQUIREMENTS

4.2.4.1 The provisions of Specification 4.0.4 are not applicable.

4.2.4.2 The DNBR shall be determined to be within its limits when THERMAL POWER is above 20% of RATED THERMAL POWER by continuously monitoring the core power distribution with the Core Operating Limit Supervisory System (COLSS) or, with the COLSS out of service, by verifying at least once per 2 hours that the DNBR, as indicated on any OPERABLE DNBR channel, is within the limit specified in the COLR.

4.2.4.3 At least once per 31 days, the COLSS Margin Alarm shall be verified to actuate at a THERMAL POWER level less than or equal to the core power operating limit based on DNBR.

AZIMUTHAL POWER TILT - Tq (Continued)

AZIMUTHAL POWER TILT is measured by assuming that the ratio of the power at any core location in the presence of a tilt to the untilted power at the location is of the form:

$$P_{tilt}/P_{untilt} = 1 + T_q\ g \cos(\theta - \theta_o)$$

where:

T_q is the peak fractional tilt amplitude at the core periphery

g is the radial normalizing factor

θ is the azimuthal core location

θ_o is the azimuthal core location of maximum tilt

P_{tilt}/P_{untilt} is the ratio of the power at a core location in the presence of a tilt to the power at that location with no tilt.

3/4.2.4 DNBR MARGIN

The limitation on DNBR as a function of AXIAL SHAPE INDEX represents a conservative envelope of operating conditions consistent with the safety analysis assumptions and which have been analytically demonstrated adequate to maintain an acceptable minimum DNBR throughout all anticipated operational occurrences. Operation of the core with a DNBR at or above this limit provides assurance that an acceptable minimum DNBR will be maintained.

Either of the two core power distribution monitoring systems, the Core Operating Limit Supervisory System (COLSS) and the DNBR channels in the Core Protection Calculators (CPCs), provides adequate monitoring of the core power distribution and is capable of verifying that the DNBR does not violate its limits. The COLSS performs this function by continuously monitoring the core power distribution and calculating a core operating limit corresponding to the allowable minimum DNBR. The COLSS calculation of core power operating limit based on the minimum DNBR limit includes appropriate penalty factors which provide a 95/95 probability/confidence level that the core power calculated by COLSS, based on the minimum DNBR limit, is conservative with respect to the actual core power limit. These penalty factors are determined from the uncertainties associated with planar radial peaking measurements, state parameter measurement, software algorithm modelling, computer processing, rod bow, and core power measurement.

Parameters required to maintain the margin to DNB and total core power are also monitored by the CPCs. Therefore, in the event that the COLSS is not being used, operation within the limits specified in the COLR can be maintained by utilizing a predetermined DNBR as a function of AXIAL SHAPE INDEX and by monitoring the CPC trip channels. The above listed uncertainty and penalty factors plus those associated with startup test acceptance criteria are also included in the CPCs which assume a minimum core power of 20% of RATED THERMAL POWER. The 20% RATED THERMAL POWER threshold is due to the neutron flux detector system being less accurate below 20% core power. Core noise level at low power is too large to obtain usable detector readings.

DNBR MARGIN (Continued)

A DNBR penalty factor has been included in the COLSS and CPC DNBR calculations to accommodate the effects of rod bow. The amount of rod bow in each assembly is dependent upon the average burnup experienced by that assembly. Fuel assemblies that incur higher average burnup will experience a greater magnitude of rod bow. Conversely, lower burnup assemblies will experience less rod bow. In design calculations, the penalty for each batch required to compensate for rod bow is determined from a batch's maximum average assembly burnup applied to the batch's maximum integrated planar-radial power peak. A single net penalty for COLSS and CPC is then determined from the penalties associated with each batch, accounting for the offsetting margins due to the lower radial power peaks in the higher burnup batches.

3/4.2.5 RCS FLOW RATE

This specification is provided to ensure that the actual RCS total flow rate is maintained at or above the minimum value used in the LOCA safety analyses, and that the DNBR is maintained within the safety limit for Anticipated Operational Occurrences (AOO).

3/4.2.6 REACTOR COOLANT COLD LEG TEMPERATURE

• (DRN 04-1243, Ch. 38)

This specification is provided to ensure that the actual value of reactor coolant cold leg temperature is maintained within the range of values used in the safety analyses, with adjustment for instrument accuracy of ±3•F, and that the peak linear heat generation rate and the moderator temperature coefficient effects are validated. The safety analysis assumes that cold leg temperature is maintained between 533•F and 552•F or indicated temperatures of 536•F and 549•F.

• (DRN 04-1243, Ch. 38)

3/4.2.7 AXIAL SHAPE INDEX

• (DRN 02-458, Ch. 12)

This specification is provided to ensure that the actual value of AXIAL SHAPE INDEX is maintained within the range of values used in the safety analyses, to ensure that the peak fuel centerline temperature and DNBR remain within the safety limits for Anticipated Operational Occurrences (AOO).

• (DRN 02-458, Ch. 12)

3/4.2.8 PRESSURIZER PRESSURE

• (DRN 04-1243, Ch. 38)

This specification is provided to ensure that the actual value of pressurizer pressure is maintained within the range of values used in the safety analyses. The inputs to CPCs and COLSS are the most limiting. The values are adjusted for an instrument uncertainty of ± 35 psi. The safety analysis assumes that pressurizer pressure is maintained between 2090 psia and 2310 psia or indicated pressurizer pressures of 2125 psia and 2275 psia.

• (DRN 04-1243, Ch. 38)

DNBR MARGIN

3.2.4 The DNBR margin shall be maintained by one of the following methods:

a) When COLSS is in service and neither CEAC is operable: maintain COLSS calculated core power less than or equal to COLSS calculated core power operating limit based on DNBR decreased by 13% RATED THERMAL POWER.

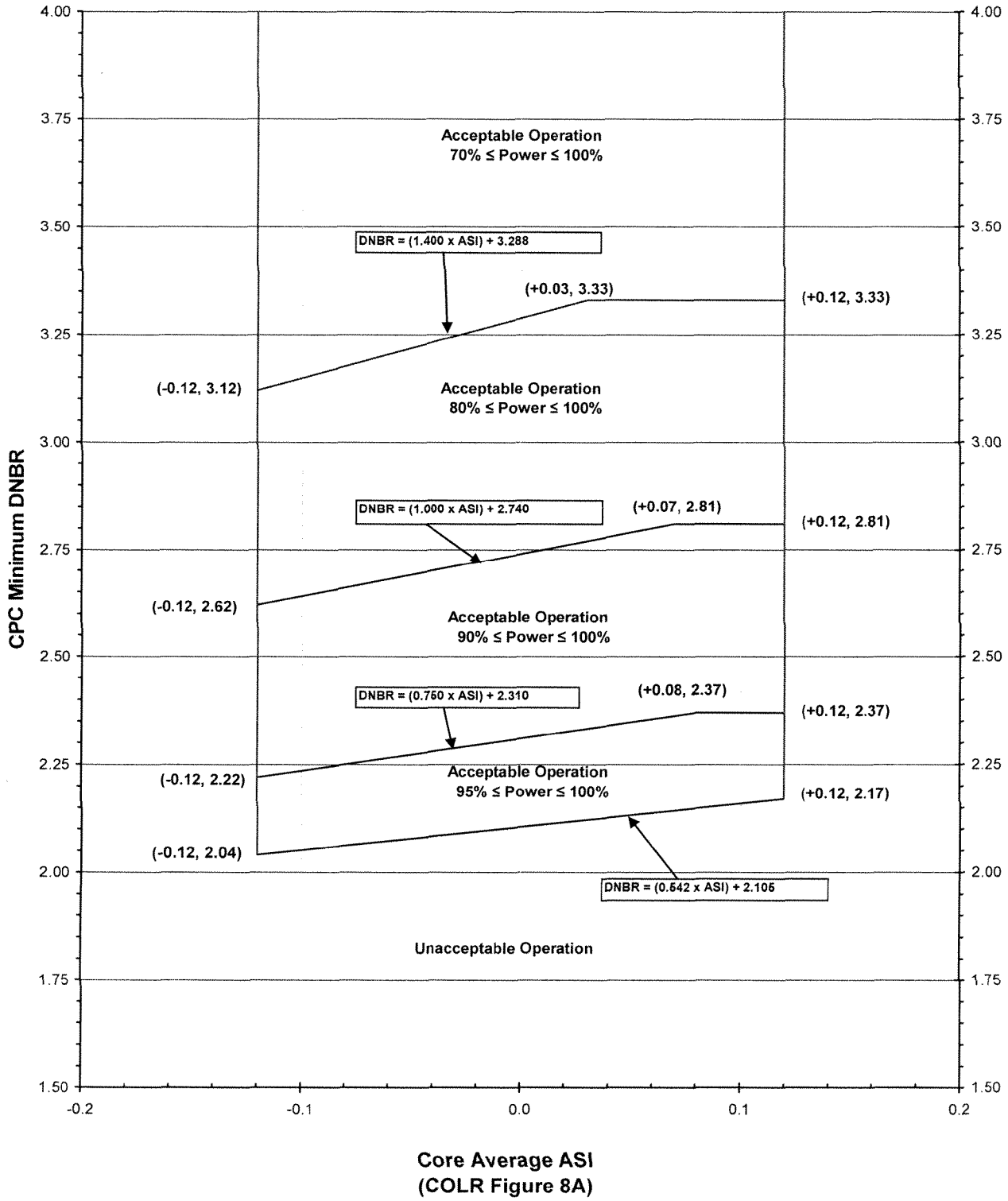
b) When COLSS is out of service and at least one CEAC is operable: operate within the region of acceptable operation shown on COLR Figure 8.1 (or 8.1A as appropriate), using any operable CPC channel. Figures 8 and 8A may be used in place of Figures 8.1 and 8.1A through 400 EFPD.

c) When COLSS is out of service and neither CEAC is operable: operate within the region of acceptable operation shown on COLR Figure 9.1 (or 9.1A as appropriate), using any operable CPC channel. Figures 9 and 9A may be used in place of Figures 9.1 and 9.1A through 400 EFPD.

NOTES

1. The various DNBR limit lines shown between the vertical ASI limit lines on Figures 8, 8A, 9, 9A, 8.1, 8.1A, 9.1, and 9.1A represent the minimum CPC-calculated DNBR value required for operation in the power range displayed in the area above each line. Operation at lower power levels requires that a larger DNBR value be maintained. For example, with ASI equal to -0.12 and a core power of 85%, CPC calculated DNBR must be a minimum of 2.62 with any CEAC Operable. At 79% power and the same ASI value with any CEAC Operable, the calculated DNBR must be at least 3.12. At 65% power and the same ASI value, DNBR must be a minimum of 4.28. At 90% power and an ASI value of +0.08, DNBR must be no less than 2.37.
2. The vertical ASI limit lines shown on Figures 8, 8A, 9, 9A, 8.1, 8.1A, 9.1, and 9.1A may be considered as extending beyond the maximum DNBR value on the Y-axis of the charts. Therefore, when monitoring DNBR with these figures, compliance is achieved at all power levels shown on a given figure when DNBR is greater than the largest DNBR value on the vertical scale.
3. Figures 8A and 8.1A are provided to offer better resolution for the four power ranges in the lower portion of Figures 8 and 8.1. Figures 9A and 9.1A are provided to offer better resolution for the four power ranges in the lower portion of Figures 9 and 9.1.
4. Equations are provided on Figures 8, 8A, 9, 9A, 8.1, 8.1A, 9.1, and 9.1A to assist in determining DNBR limits in the sloped portions of the plots.

Subset of Allowable DNBR with Any CEAC Operable
(COLSS Out of Service)



Core Average ASI
(COLR Figure 8A)

NOTE: This figure is applicable only to Cycle 16 burnups up to 400 EFPD

Waterford 3

2009 NRC Exam

JOB PERFORMANCE MEASURE

A7

Review Surveillance OP-903-008, Reactor Coolant System Isolation Leakage Test

Applicant: _____

Examiner: _____

JOB PERFORMANCE MEASURE
DATA PAGE

Task: Review Surveillance OP-903-008, Reactor Coolant System Isolation Leakage Test

Task Standard: Applicant reviews completed OP-903-008 paperwork and documents errors on Attachments 10.11, and identifies Technical Specification 3.4.5.2.e, action c, applicable.

References: OP-903-008, Reactor Coolant System Isolation Leakage Test
Technical Specification 3.4.5.2

Validation Time: 30 minutes Time Critical: No

Alternate Path: No

Applicant: _____

Time Start: _____ Time Finish: _____

Performance Time: _____ minutes

Performance Rating: SAT UNSAT

Comments: _____

_____

_____

_____

_____

Examiner: _____ Date: _____
Signature

EXAMINER COPY ONLY

Tools/Equipment/Procedures Needed:

OP-903-008, Reactor Coolant System Isolation Leakage Test, Attachment 10.11, Safety Injection Tank Outlet Check Valves Leak Rate Data, and 10.16, Acceptance Criteria and Test Acceptance.

READ TO APPLICANT

DIRECTION TO APPLICANT:

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

INITIAL CONDITIONS:

The plant is in Mode 4.
OP-903-008 is in progress.
The data has been recorded for SI-329 A and ready for review.

INITIATING CUES:

- Review OP-903-008, Reactor Coolant System Isolation Leakage Test.
  - Document any errors or discrepancies identified, if any.
  - Document any necessary actions identified, if any.

TASK ELEMENT	STANDARD
Applicant reviews OP-903-008, Attachment 10.11.	The applicant identifed that the calculation of Extrapolation Ratio Coefficient, C_E, is incorrect. This error, after corrected, results in the Corrected Leak Rate R_C going from 0.512 gpm to 1.02 gpm.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Applicant reviews OP-903-008, Attachment 10.11.	The correct leak rate does not meet the acceptance criteria. Applicant identified the need to enter Tech Spec 3.4.5.2.e, action c.
Comment:	**Critical** **SAT / UNSAT**

END OF TASK

APPLICANT CUE SHEET

(TO BE RETURNED TO EXAMINER TO UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

The plant is in Mode 4.
OP-903-008 is in progress.
The data has been recorded for SI-329 A and ready for review.

INITIATING CUES:

- Review OP-903-008, Reactor Coolant System Isolation Leakage Test.
  - Document any errors or discrepancies identified, if any.
  - Document any necessary actions identified, if any.

10.11 SAFETY INJECTION TANK OUTLET CHECK VALVES LEAK RATE DATA

Step No.			
7.11.2	**SI-329A Test Permission**:		
	CR Supervisor	10/5/09 / 0700	
	(SM/CRS Signature)	(Date/Time)	
7.11.8.8	Initial SI Loop 1A Leak Detection Pressure (PMC PID A43006)	1658	PSIG
	Initial SIT 1A Pressure (SI-IPI-0311, SI-IPI-0312 or SI-IPI-0313)	516	PSIG
	Initial millivolt value SIT 1A Level (PMC PID A44101 or A44102) (MV_i)	6924	
	Initial ΔP:	1142	PSID
	Start Time:	0900	
7.11.8.10.2	Stop Time:	0920	
	Elapsed Time (T_E):	20	min
	Final SI Loop 1A Leak Detection Pressure (PMC PID A43006)	1695	PSIG
	Final SIT 1A Pressure (SI-IPI-0311, SI-IPI-0312 or SI-IPI-0313)	515	PSIG
	Final millivolt value SIT 1A Level (PMC PID A44101 or A44102) (MV_f):	6975	
	Final ΔP:	1180	PSID
	Lowest of Initial ΔP and Final ΔP (ΔP_L):	1142	PSID
7.11.8.11	Corrected Leak Rate Calculation for SI-329A:		

GROSS LEAK RATE (R_G):

R_G = [.286 X (MV_f - MV_i)] / T_E

R_G = [.286 X (6975 - 6924)] / T_E

R_G = [.286 X (51)] / T_E

R_G = [14.586] / T_E

R_G = 14.586 gal / 20 min

R_G = 0.73 GPM

EXTRAPOLATION RATIO COEFFICIENT (C_E): (N/A if R_G = 0)

C_E = [2235 PSID / ΔP_L]$^{0.5}$

C_E = [2235 PSID / 1142 PSID]$^{0.5}$

C_E = [1.96]$^{0.5}$

C_E = 0.714

CORRECTED LEAK RATE (R_C):

R_C = R_G X C_E

R_C = 0.73 GPM X 0.714

R_C = 0.512 GPM

			(Init)		(Init)
7.11.13	CVC-199 Locked Closed (may be N/A):	Performed:	N/A	Verified:	N/A
7.11.14	SI-219A and SI-219B Locked Open:	Performed:	[illegible]	Verified:	[illegible]

Calculations Performed by:

Joe Operator — 10/5/09 / 1100

(Operator or STA Signature) (Date/Time)

Calculations Verified by:

Tom STA — 10/5/09 / 1200

(STA or Operator Signature) (Date/Time)

10.16 ACCEPTANCE CRITERIA AND TEST ACCEPTANCE

		INITIALS
10.16.1	For all check valves tested, test is acceptable if leakage is less than or equal to 1 GPM.	_____
10.16.2	For Power Operated valves tested, test is acceptable if leakage is: 1) Less than or equal to 1 GPM OR 2) Greater than 1 GPM but less than or equal to 5 GPM, if the latest measured rate has not exceeded the rate determined by the previous test by an amount that reduces the margin between the previous measured leakage rate and the maximum permissible rate of 5 GPM by 50% or more.	_____ _____
10.16.3	Send a copy of Attachment 10.12, Result Summary Table, to the Programs IST Coordinator.	_____

REMARKS: _____

_____

_____

Performed by:		Verified by:	
_____	_____/_____	_____	_____/_____
(RO or SRO Signature)	(Date/Time)	(RO or SRO Signature)	(Date/Time)
_____	_____/_____	_____	_____/_____
(AO Signature)	(Date/Time)	(AO Signature)	(Date/Time)
_____	_____/_____	_____	_____/_____
(STA Signature)	(Date/Time)	(STA Signature)	(Date/Time)

All data reviewed and test accepted by:

_____ _____/_____

(SM/CRS Signature) (Date/Time)

A7 Key

10.11 SAFETY INJECTION TANK OUTLET CHECK VALVES LEAK RATE DATA

Step No.			
7.11.2	**SI-329A Test Permission:**		
	CR Supervisor	10/5/09 / 0700	
	(SM/CRS Signature)	(Date/Time)	
7.11.8.8	Initial SI Loop 1A Leak Detection Pressure (PMC PID A43006)	1658	PSIG
	Initial SIT 1A Pressure (SI-IPI-0311, SI-IPI-0312 or SI-IPI-0313)	516	PSIG
	Initial millivolt value SIT 1A Level (PMC PID A44101 or A44102) (MV_i)	6924	
	Initial ΔP:	1142	PSID
	Start Time:	0900	
7.11.8.10.2	Stop Time:	0920	
	Elapsed Time (T_E):	20	min
	Final SI Loop 1A Leak Detection Pressure (PMC PID A43006)	1695	PSIG
	Final SIT 1A Pressure (SI-IPI-0311, SI-IPI-0312 or SI-IPI-0313)	515	PSIG
	Final millivolt value SIT 1A Level (PMC PID A44101 or A44102) (MV_f):	6975	
	Final ΔP:	1180	PSID
	Lowest of Initial ΔP and Final ΔP (ΔP_L):	1142	PSID

7.11.8.11 Corrected Leak Rate Calculation for SI-329A:

GROSS LEAK RATE (R_G):

R_G = [.286 X (MV_f - MV_i)] / T_E

R_G = [.286 X (6975 - 6924)] / T_E

R_G = [.286 X (51)] / T_E

R_G = [14.586] / T_E

R_G = 14.586 gal / 20 min

R_G = 0.73 GPM

EXTRAPOLATION RATIO COEFFICIENT (C_E): (N/A if R_G = 0)

C_E = [2235 PSID / ΔP_L]$^{0.5}$

C_E = [2235 PSID / 1142 PSID]$^{0.5}$

C_E = [1.96]$^{0.5}$

C_E = 0.714 1.4

CORRECTED LEAK RATE (R_C):

R_C = R_G X C_E

R_C = 0.73 GPM X 0.714 1.4

R_C = 0.512 GPM 1.02

			(Init)		(Init)
7.11.13	CVC-199 Locked Closed (may be N/A):	Performed:	N/A	Verified:	N/A
7.11.14	SI-219A and SI-219B Locked Open:	Performed:	[illegible]	Verified:	[illegible]

Calculations Performed by:

Joe Operator — 10/5/09 / 1100

(Operator or STA Signature) (Date/Time)

Calculations Verified by:

Tom STA — 10/5/09 / 1200

(STA or Operator Signature) (Date/Time)

OPERATIONAL LEAKAGE

LIMITING CONDITION FOR OPERATION

3.4.5.2 Reactor Coolant System operational leakage shall be limited to:

a. No PRESSURE BOUNDARY LEAKAGE,

b. 1 gpm UNIDENTIFIED LEAKAGE,

c. 75 gallons per day primary to secondary leakage through any one steam generator (SG),

d. 10 gpm IDENTIFIED LEAKAGE from the Reactor Coolant System, and

e. 1 gpm leakage at a Reactor Coolant System pressure of 2250 ± 20 psia from any Reactor Coolant System pressure isolation valve specified in Table 3.4-1.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

a. With any PRESSURE BOUNDARY LEAKAGE, or primary to secondary leakage not within limit, be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With any Reactor Coolant System operational leakage greater than any one of the limits, excluding PRESSURE BOUNDARY LEAKAGE, primary to secondary leakage, and leakage from Reactor Coolant System pressure isolation valves, reduce the leakage rate to within limits within 4 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. With any Reactor Coolant System pressure isolation valve leakage greater than the above limit, isolate the high pressure portion of the affected system from the low pressure portion within 4 hours by use of at least one closed manual or deactivated automatic valve, or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

NOTE: Not required to be performed until 12 hours after establishment of steady state operation.

4.4.5.2.1 Reactor Coolant System leakages, except for primary to secondary leakage, shall be demonstrated to be within each of the above limits by performance of a Reactor Coolant System water inventory balance at least once per 72 hours.

4.4.5.2.2 Primary to secondary leakage shall be verified to be ≤ 75 gallons per day through any one SG at least once per 72 hours.

SURVEILLANCE REQUIREMENTS (Continued)

4.4.5.2.3 Each Reactor Coolant System pressure isolation valve specified in Table 3.4-1, Section A and Section B, shall be demonstrated OPERABLE by verifying leakage to be within its limit:

a. At least once per 18 months,

b. Prior to entering MODE 2 whenever the plant has been in COLD SHUTDOWN for 7 days or more and if leakage testing has not been performed in the previous 9 months,

c. Prior to returning the valve to service following maintenance, repair, or replacement work on the valve,

d. Following valve actuation for valves in Section B due to automatic or manual action or flow through the valve:

   1. Within 24 hours by verifying valve closure, and

   2. Within 31 days by verifying leakage rate.

The provisions of Specification 4.0.4 are not applicable for entry into MODE 3 or 4.

4.4.5.2.4 Each Reactor Coolant System pressure isolation valve power-operated valve specified in Table 3.4-1, Section C, shall be demonstrated OPERABLE by verifying leakage to be within its limit:

a. At least once per 18 months, and

b. Prior to returning the valve to service following maintenance, repair, or replacement work on the valve.

The provisions of Specification 4.0.4 are not applicable for entry into MODE 3 or 4.

TABLE 3.4-1

REACTOR COOLANT SYSTEM PRESSURE ISOLATION VALVES

SECTION A	
SI-329A	SIT Check
SI-329B	"
SI-330A	"
SI-330B	"
SI-336A	Cold Leg Injection Check
SI-336B	"
SI-335A	"
SI-335B	"
SI-510A	Hot Leg Injection Check
SI-512A	"
SI-510B	"
SI-512B	"
SI-241	HPSI Check
SI-242	"
SI-243	"
SI-244	"
SECTION B	
SI-142A	LPSI Check
SI-142B	"
SI-143A	"
SI-143B	"
SECTION C POWER-OPERATED VALVES	
SI-401A	SDC Suction Isolation
SI-401B	"
SI-405A	"
SI-405B	"

(a) Maximum Allowable Leakage (each valve):

1. Except as noted below, leakage rates greater than 1.0 gpm are unacceptable.
2. For power-operated valves (POVs) only, leakage rates greater than 1.0 gpm but less than or equal to 5.0 gpm are acceptable if the latest measured rate has not exceeded the rate determined by the previous test by an amount that reduces the margin between previous measured leakage rate and the maximum permissible rate of 5.0 gpm by 50% or greater.
3. For power-operated valves (POVs) only, leakage rates greater than 1.0 gpm but less than or equal to 5.0 gpm are unacceptable if the latest measured rate exceeded the rate determined by the previous test by an amount that reduces the margin between measured leakage rate and the maximum permissible rate of 5.0 gpm by 50% or greater.
4. Leakage rates greater than 5.0 gpm are unacceptable.

(b) To satisfy ALARA requirements, leakage may be measured indirectly (as from the performance of pressure indicators) if accomplished in accordance with approved procedures and supported by computations showing that the method is capable of demonstrating valve compliance with the leakage criteria.

(c) Minimum test differential pressure shall not be less than 200 psid.

Monitoring Containment Sump In-Leakage Flow

During automatic operation of the containment sump pumps (after a containment sump pump has operated), the flow calculation performed by the plant monitoring computer based on a level change will no longer be accurate since the level in the sump will be lowering. A 20 minute time period has been conservatively determined based on engineering calculations for this equipment operation. In addition, upon reboot of the plant monitoring computer, a period of 10 minutes is required for the leak rate calculation to become available. It has been determined these time periods (independent or combined) of calculation sump in-leakage flow inaccuracies, the instrumentation remains adequate to detect a leakage rate, or its equivalent, of one gpm in less than one hour; therefore, the containment sump level instrumentation and the corresponding flow calculation is considered to remain operable.

References

3. 10 CFR 50, Appendix A, Section IV, GDC 30.
4. Regulatory Guide 1.45, Revision 0, dated May 1973.
5. UFSAR, Sections 5.2.5 and 12.3.

< (DRN 04-1223, Ch. 33)

3/4.4.5.2 OPERATIONAL LEAKAGE

Industry experience has shown that while a limited amount of leakage is expected from RCS, the unidentified portion of this leakage can be reduced to a threshold value of less than 1 gpm. This threshold value is sufficiently low to ensure early detection of additional leakage.

The 10 gpm IDENTIFIED LEAKAGE limitation provides allowances for a limited amount of leakage from known sources whose presence will not interfere with the detection of UNIDENTIFIED LEAKAGE by the leakage detection systems.

> (EC-3173 Ch. 53)

For reactor coolant system operational leakage determination, steady state operation is required to perform a proper water balance since calculations during maneuvering are not useful and cannot ensure an accurate measurement is obtained (e.g. when operating in the shutdown cooling mode). The RCS water inventory balance must be performed with the reactor at stable operating pressure and steady state conditions (stable temperature, power level, pressurizer and makeup tank levels, makeup and letdown, and RP seal injection and return flows). Therefore, a Note is added allowing that this surveillance is required to be performed within 12 hours at stable operating pressure after establishing steady state operation. The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established.

The SR 4.4.5.2.1 performance after establishing steady state operation is consistent with the use and application guidance of section 1.4, Frequency, of NUREG-1432 Rev. 3.0, "Improved Standard Technical Specification Combustion Engineering Plants," March 31, 2004. In accordance with this guidance, the NOTE modifies the required performance of the Surveillance and it is construed to be part of the surveillance interval. Even though the SR is not annotated with a 4.0.4 exemption, the SR is not required to be performed prior to entering a

< (EC-3173 Ch. 53)

3/4.4.5.2 OPERATIONAL LEAKAGE

> (EC-3173 Ch. 53)

MODE in the Applicability of the associated LCO if any of the following conditions are satisfied: (1) the SR has been performed within the surveillance interval (i.e. it is current) and is known not to be failed or (2) the SR is required to be met, but not performed, in the MODE to be entered and is known not to be failed. The initial surveillance performance will be completed within 12 hours once the plant is at stable operating pressure following the establishment of steady state conditions. Other instruments such as those contained in TS 3/4.4.5.1 can be utilized to determine whether RCS operational leakage limits are being exceeded prior to initial performance.

Once the plant establishes steady state operation, 12 hours is allowed for completing the SR. If the SR was not performed within this 12 hour interval, there would then be a failure to perform the SR within the specified interval, and the provisions of 4.0.3 would apply. Should the 72 hour interval be exceeded while steady state operation has not been established, this NOTE allows 12 hours after steady state operation has been established to perform the SR. The SR is still considered to be performed within the surveillance interval. Therefore, if the Surveillance was not performed within the 72 hour (plus the extension allowed by 4.0.2) interval, but steady state operation was not established, it would not constitute a failure of the SR or failure to meet the LCO. Also, no violation of 4.0.4 occurs when changing MODES, even with the 72 hour surveillance interval not met, provided operation does not exceed 12 hours with the establishment of steady state operation.

< (EC-3173 Ch. 53)

The Surveillance Requirements for RCS pressure isolation valves provide added assurance of valve integrity thereby reducing the probability of gross valve failure and consequent intersystem LOCA. Leakage from the RCS pressure isolation valves is IDENTIFIED LEAKAGE and will be considered as a portion of the allowable limit.

> (DRN 04-1243, Ch. 38; 06-916, Ch. 48)

The primary to secondary leakage limit of 75 gallons per day through any one SG is based on the operational leakage performance criterion in NEI 97-06. The Steam Generator Program operational leakage performance criterion in NEI 97-06 states, “The RCS operational primary to secondary leakage through any one SG shall be limited to 150 gallons per day.” The NEI 97-06 limit is based on operating experience with SG tube degradation mechanisms that result in tube leakage. The operational leakage rate criterion (since it is less than 150 gpd through any one SG) in conjunction with the implementation of the Steam Generator Program is an effective measure for minimizing the frequency of steam generator tube ruptures.

< (DRN 04-1243, Ch. 38; 06-916, Ch. 48)

OPERATIONAL LEAKAGE (Continued)

• (DRN 04-1243, Ch. 38)

Steam generator tube cracks having primary-to-secondary leakage less than 150 gpd per steam generator during operation will have an acceptable margin of safety to withstand loads imposed during normal operation and postulated accidents (Reference NEI 97-06). Due to the proximity of the east atmospheric dump valve to the east control room intake, the primary-to-secondary leakage limit required to achieve acceptable radiological consequences, for accidents that rely on reactor coolant system cooldown using the steam generators, is limiting. Therefore, 75 gpd per steam generator is imposed as the primary-to-secondary operational leakage limit.

• (DRN 04-1243, Ch. 38)

PRESSURE BOUNDARY LEAKAGE of any magnitude is unacceptable since it may be indicative of an impending gross failure of the pressure boundary. Therefore, the presence of any PRESSURE BOUNDARY LEAKAGE requires the unit to be promptly placed in COLD SHUTDOWN.

3/4.4.6 CHEMISTRY

The limitations on Reactor Coolant System chemistry ensure that corrosion of the Reactor Coolant System is minimized and reduces the potential for Reactor Coolant System leakage or failure due to stress corrosion. Maintaining the chemistry within Steady State Limits provides adequate corrosion protection to ensure the structural integrity of the Reactor Coolant System over the life of the plant. The associated effects of exceeding the oxygen, chloride and fluoride limits are time and temperature dependent. Corrosion studies show that operation may be continued with contaminant concentration levels in excess of the Steady State Limits, up to the Transient Limits, for the specified limited time intervals without having a significant effect on the structural integrity of the Reactor Coolant System. The time interval permitting continued operation within the restrictions of the Transient Limits provides time for taking corrective actions to restore the contaminant concentrations to within Steady State Limits.

The Surveillance Requirements provide adequate assurance that concentrations in excess of the limits will be detected in sufficient time to take corrective action.

3/4.4.7 SPECIFIC ACTIVITY

• (DRN 03-173, Ch. 18; 05-131, Ch. 39)

The Code of Federal Regulations, 10 CFR 50.67 specifies the maximum total effective dose equivalent an individual offsite can receive during a design basis accident. The LCO contains specific activity limits for both DOSE EQUIVALENT I-131 and gross specific activity. The specific activity limits ensure that these doses are held within the appropriate 10 CFR 50.67 requirements (small fraction, well within, or within) during analyzed transients and accidents.

• (DRN 05-131, Ch. 39)

Operation with iodine specific activity levels greater than the LCO limit is permissible for up to 48 hours, provided the activity levels do not exceed 60 uCi/gm. A 48 hour limit was established because of the low probability of an accident occurring during this period. The dose consequences of an accident during this 48 hour period would not exceed the full 10 CFR 50.67 limits.

The surveillance requirements provide adequate assurance that excessive specific activity levels in the primary coolant will be detected in sufficient time to take corrective action.

• (DRN 03-173, Ch. 18)

Waterford 3

2009 NRC Exam

JOB PERFORMANCE MEASURE

A8

Plan Work and Assign Workers Based on Dose Rates and Shielding

Applicant: _____

Examiner: _____

JOB PERFORMANCE MEASURE
DATA PAGE

Task: Plan Work and Assign Workers Based on Dose Rates and Shielding

Task Standard: Applicant calculates dose with and without shielding, and with 1 or 2 workers, and directs job to achieve the lowest dose.

References: None

Validation Time: 30 minutes Time Critical: No

Alternate Path: No

Applicant: _____

Time Start: _____ Time Finish: _____

Performance Time: _____ minutes

Performance Rating: SAT UNSAT

Comments: _____

_____

_____

_____

_____

Examiner: _____ Date: _____
Signature

EXAMINER COPY ONLY

Tools/Equipment/Procedures Needed:

None

READ TO APPLICANT

DIRECTION TO APPLICANT:

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

Refuel 16 is in progress and Safety Injection Train A is being aligned from its Shutdown Cooling alignment to its Safety Injection alignment. You are the Work Management Center SRO and have been assigned to coordinate the venting of Safety Injection Train A.

- The dose rates in Safeguards Room A are 400 mrem/hour unshielded.
- Installing shielding will reduce the dose rate to 110 mrem/hour.
- It will take 2 workers 25 minutes to install the shielding (25 minutes each worker).
- It will take 1 person 90 minutes to complete the venting if he works alone.
- It will take 2 people 36 minutes to complete the venting (36 minutes each worker).

How will you direct the execution of the Safety Injection System venting to allow the least amount of total worker dose?

TASK ELEMENT	STANDARD
Calculate dose for 1 worker with no shielding installed.	Applicant calculated 600 mrem total dose.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Calculate dose for 2 workers with no shielding installed.	Applicant calculated 480 mrem total dose.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Calculate dose for 1 worker with shielding installed.	Applicant calculated 498 mrem total dose.
Comment: Installing the shielding results in 333 mrem total dose. Performing the work with 1 worker will result in 165 mrem + 333 mrem = total dose of 498 mrem	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Calculate dose for 2 workers with shielding installed.	Applicant calculated 465 mrem total dose.
Comment: Installing the shielding results in 333 mrem total dose. Performing the job with 2 workers will result in 132 mrem + 333 mrem = total dose of 465 mrem	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Applicant assigns job.	Job assigned to 2 workers with shielding installed.
Comment: Installing the shielding results in 333 mrem total dose. Performing the job with 2 workers will result in 132 mrem + 333 mrem = total dose of 465 mrem	**Critical** **SAT / UNSAT**

END OF TASK

APPLICANT CUE SHEET

(TO BE RETURNED TO EXAMINER TO UPON COMPLETION OF TASK)

Refuel 16 is in progress and Safety Injection Train A is being aligned from its Shutdown Cooling alignment to its Safety Injection alignment. You are the Work Management Center SRO and have been assigned to coordinate the venting of Safety Injection Train A.

- The dose rates in Safeguards Room A are 400 mrem/hour unshielded.
- Installing shielding will reduce the dose rate to 110 mrem/hour.
- It will take 2 workers 25 minutes to install the shielding (25 minutes each worker).
- It will take 1 person 90 minutes to complete the venting if he works alone.
- It will take 2 people 36 minutes to complete the venting (36 minutes each worker).

How will you direct the execution of the Safety Injection System venting to allow the least amount of total worker dose? Show all calculations to support your answer.

Waterford 3

2009 NRC Exam

JOB PERFORMANCE MEASURE

A9

Classify Emergency Plan Entry Level

Applicant: _____

Examiner: _____

JOB PERFORMANCE MEASURE
DATA PAGE

Task: Classify Emergency Plan Entry Level

Task Standard: Applicant determines correct E Plan Emergency Action Level.

References: EP-001-001 Recognition and Classification of Emergency Conditions

Validation Time: 15 minutes Time Critical: No

Alternate Path: No

Applicant: _____

Time Start: _____ Time Finish: _____

Performance Time: _____ minutes

Performance Rating: SAT UNSAT

Comments: _____

_____

_____

_____

_____

Examiner: _____ Date: _____
Signature

EXAMINER COPY ONLY

Tools/Equipment/Procedures Needed:

None

READ TO APPLICANT

DIRECTION TO APPLICANT:

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

Instructions on applicant's cue sheet

Plant status is as follows:

- The plant is at 100%.
- EDG A is tagged out for an oil change.
- You are the Emergency Coordinator.

At 1045, the plant tripped due to a loss of offsite power.
Emergency Diesel Generator B started, but the output breaker will not close. The EDG B Output Breaker has been identified as the problem.

At 1100, PME personnel commenced efforts to replace the Emergency Diesel Generator B output breaker with the Emergency Diesel Generator A output breaker. The breaker swap will take approximately 20 minutes.

1. Based on these conditions, determine which Emergency Plan Action Level should be entered, if any.
2. How does your classification change, if at all, if during this event, RCS pressure was 1800 PSIA and dropping, with indications of a Pressurizer Relief valve lifting?

Provide answers to part 1 and part 2 on this sheet.

TASK ELEMENT	STANDARD
Determine the correct EAL for plant conditions.	Enter a Site Area Emergency based on SS1, Loss of all off site power and loss of all onsite AC power to essential busses.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Determine upgrade based on changing conditions listed as part 2.	Upgrade to a General Emergency based on SG1, Prolonged loss of all offsite power and prolonged loss of all onsite AC power to essential busses.
Comment:	**Critical** **SAT / UNSAT**

END OF TASK

APPLICANT CUE SHEET

(TO BE RETURNED TO EXAMINER TO UPON COMPLETION OF TASK)

Plant status is as follows:

- The plant is at 100%.
- EDG A is tagged out for an oil change.
- You are the Emergency Coordinator.

At 1045, the plant tripped due to a loss of offsite power.
Emergency Diesel Generator B started, but the output breaker will not close. The EDG B Output Breaker has been identified as the problem.

At 1100, PME personnel commenced efforts to replace the Emergency Diesel Generator B output breaker with the Emergency Diesel Generator A output breaker. The breaker swap will take approximately 20 minutes.

1. Based on these conditions, determine which Emergency Plan Action Level should be entered, if any.
2. How does your classification change, if at all, if during this event, RCS pressure was 1800 PSIA and dropping, with indications of a Pressurizer Relief valve lifting?

Provide answers to part 1 and part 2 on this sheet.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
FISSION PRODUCT BARRIER DEGRADATION			
FG1 Loss of ANY two Barriers AND Loss or Potential Loss of Third barrier. 1 2 3 4	**FS1** Loss or Potential Loss of ANY two Barriers. 1 2 3 4	**FA1** ANY loss or ANY Potential Loss of EITHER Fuel Clad or RCS. 1 2 3 4	**FU1** ANY loss or ANY Potential Loss of Containment. 1 2 3 4

Plant Modes (white boxes indicate applicable modes) 1 **Power Operations** 2 **Startup** 3 **Hot Standby** 4 **Hot Shutdown** 5 **Cold Shutdown** 6 **Refueling** D **Defueled**

Note: Determine which combination of the three barriers are lost or have a potential loss and use the above key to classify the event. Also an event or multiple events could occur which result in the conclusion that exceeding the loss or potential loss thresholds is imminent (i.e., within 1 to 2 hours). In this imminent loss situation use judgment and classify as if the thresholds are exceeded.

SEE FOLLOWING PAGE FOR EALS FOR BARRIER LOSS AND POTENTIAL LOSS

Fuel Clad Barrier EALs

LOSS	POTENTIAL LOSS
1. Primary Coolant Activity Level (FCB1)	
RCS Dose Equivalent Iodine > 300 µCi/gm as indicated by: a. Dose Rate at one foot from Primary Sample Panel > 950 mR/hr **OR** b. -4 RAB RADIOCHEMISTRY LAB area radiation monitor (ARM-IRE-5020) > 125 mR/hr **OR** c. Chemistry sample results	Not Applicable
2. Core Exit Thermocouple Readings (FCB2)	
≥ 1200 degrees F	≥ 700 degrees F
3. Reactor Vessel Water Level (FCB3)	
Not applicable.	RVLMS upper plenum level 0%.
4. Containment Radiation Monitoring (FCB4)	
Containment High Range Radiation Monitor (ARM-IRE-5400AS or ARM-IRE-5400BS) > 1000 R/hr.	Not Applicable
5. Emergency Coordinator/EOF Director Judgment (FCB5)	
Any condition in the opinion of the Emergency Coordinator/EOF Director that indicates Loss or Potential Loss of the Fuel Clad barrier.	

RCS Barrier EALs

LOSS	POTENTIAL LOSS
1. RCS Leak Rate (RCB1)	
GREATER THAN available makeup capacity as indicated by RCS subcooling < 28º F.	Unisolable RCS leak > 44 gpm.
2. SG Tube Rupture (RCB2)	
SGTR that results in an ECCS (SI) actuation.	Not Applicable
3. Containment Radiation Monitoring (RCB3)	
Containment High Range Radiation Monitor (ARM-IRE-5400AS or ARM-IRE-5400BS) > 100 R/hr.	Not Applicable
4. Other Indications (RCB4)	
Not Applicable	RCS pressure dropping due to primary relief not reseating
5. Emergency Coordinator/EOF Director Judgment (RCB5)	
Any condition in the opinion of the Emergency Coordinator/EOF Director that indicates Loss or Potential Loss of the RCS barrier.	

Containment Barrier EALs

LOSS	POTENTIAL LOSS
1. Containment Pressure (CNB1)	
a. Rapid unexplained drop following initial rise **OR** b. Containment parameters not consistent with LOCA conditions	a. Containment pressure 50 PSIA and rising **OR** b. Explosive mixture exists **OR** c. Containment pressure > 17.7 PSIA with LESS THAN one full train of Containment Spray operating (1750 gpm)
2. Core Exit Thermocouple Readings (CNB2)	
Not Applicable	Core exit thermocouples >1200 degrees F and restoration procedures not effective within 15 minutes **OR** Core exit thermocouples > 700 degrees F with RVLMS upper plenum level equal to 0% or LOWER and restoration procedures not effective within 15 minutes
3. SG Secondary Side Release With Primary-to-Secondary Leakage (CNB3)	
Ruptured S/G is also faulted outside of containment **OR** Primary-to-Secondary leakrate >10 gpm with nonisolable steam release from affected S/G to the environment	Not Applicable
4. Containment Isolation Valve Status After Containment Isolation (CNB4)	
Unisolable breach of containment with a direct release path to the environment following containment isolation actuation.	Not Applicable
5. Significant Radioactive Inventory in Containment (CNB5)	
Not Applicable	Containment High Range Radiation Monitor (ARM-IRE-5400AS or ARM-IRE-5400BS) > 4000 R/hr.
6. Emergency Coordinator/EOF Director Judgment (CNB6)	
Any condition in the opinion of the Emergency Coordinator/EOF Director that indicates Loss or Potential Loss of the Containment barrier.	

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
SYSTEM MALFUNCTION				
Loss of AC Power	**SG1** Prolonged loss of all offsite power and prolonged loss of all onsite AC power to essential busses. (1 2 3 4) **Emergency Action Level(s):** 1. Loss of power to all unit auxiliary and startup transformers **AND** Failure of both 'A' and 'B' emergency diesel generators to supply power to emergency busses **AND** Either of the following: (a or b) a. Restoration of at least one emergency bus within 4 hours is not likely **OR** b. FA1 entry conditions met.	**SS1** Loss of all offsite power and loss of all onsite AC power to essential busses. (1 2 3 4) **Emergency Action Level(s):** 1. Loss of power to all unit auxiliary and startup transformers **AND** Failure of the 'A' and 'B' emergency diesel generators to supply power to emergency busses **AND** Failure to restore power to at least one emergency bus within 15 minutes from the time of loss of both offsite and onsite AC power.	**SA1** AC power capability to essential busses reduced to a single power source > 15 minutes such that any additional single failure would result in station blackout. (1 2 3 4) **Emergency Action Level(s):** 1. AC power capability to essential busses reduced to a single power source > 15 minutes **AND** Any additional single failure will result in station blackout.	**SU1** Loss of all offsite power to essential busses > 15 minutes. (1 2 3 4) **Emergency Action Level(s):** 1. Loss of power to all unit auxiliary and startup transformers > 15 minutes **AND** At least 'A' and 'B' emergency diesel generators supplying power to emergency busses.
Failure of Reactor Protection System	**SG3** Failure of the Reactor Protection System to complete an automatic trip and manual trip was NOT successful and there is indication of an extreme challenge to the ability to cool the core. (1 2) **Emergency Action Level(s):** 1. Indications exist that automatic and manual trip were not successful **AND** Either of the following: (a or b) a. Indication(s) exists that core cooling is extremely challenged as indicated by CET temperatures at or approaching 1200° F **OR** b. Indication(s) exists that heat removal is extremely challenged as indicated by inability to maintain at least one steam generator level > 50% wide range.	**SS3** Failure of Reactor Protection System instrumentation to complete or initiate an automatic reactor trip once a Reactor Protection System setpoint has been exceeded and manual trip was NOT successful. (1 2) **Emergency Action Level(s):** 1. Indication(s) exist that automatic and manual trip were not successful.	**SA3** Failure of Reactor Protection System instrumentation to complete or initiate an automatic reactor trip once a Reactor Protection System setpoint has been exceeded and manual trip was successful. (1 2 3) **Emergency Action Level(s):** 1. Indication(s) exist that indicate that the Reactor Protection System setpoint was exceeded and automatic trip did not occur and a successful manual trip occurred.	

Plant Modes (white boxes indicate applicable modes) 1 **Power Operations** 2 **Startup** 3 **Hot Standby** 4 **Hot Shutdown** 5 **Cold Shutdown** 6 **Refueling** D **Defueled**

FISSION PRODUCT BARRIER DEGRADATION

FISSION PRODUCT BARRIER DEGRADATION

FU1 – Initiating Condition – NOTIFICATION OF UNUSUAL EVENT

ANY loss or ANY Potential Loss of Containment.

Operating Mode Applicability:

Power Operations (Mode 1)
Startup (Mode 2)
Hot Standby (Mode 3)
Hot Shutdown (Mode 4)

FA1 – Initiating Condition – Alert

ANY loss or ANY Potential Loss of EITHER Fuel Clad or RCS

Operating Mode Applicability:

Power Operations (Mode 1)
Startup (Mode 2)
Hot Standby (Mode 3)
Hot Shutdown (Mode 4)

FS1 – Initiating Condition – Site Area Emergency

Loss or Potential Loss of ANY two Barriers

Operating Mode Applicability:

Power Operations (Mode 1)
Startup (Mode 2)
Hot Standby (Mode 3)
Hot Shutdown (Mode 4)

FG1 – Initiating Condition – General Emergency

Loss of ANY two Barriers AND Loss or Potential Loss of Third barrier

Operating Mode Applicability:

Power Operations (Mode 1)
Startup (Mode 2)
Hot Standby (Mode 3)
Hot Shutdown (Mode 4)

FISSION PRODUCT BARRIER DEGRADATION

General Bases:

The logic used for these Initiating Conditions reflects the following considerations:

- The Fuel Clad Barrier and the RCS Barrier are weighted more heavily than the Containment Barrier. Unusual Event ICs associated with RCS and Fuel Clad Barriers are addressed under System Malfunction (S) ICs.

- At the Site Area Emergency level, there must be some ability to dynamically assess how far present conditions are from the threshold for a General Emergency. For example, if Fuel Clad and RCS Barrier "Loss" EALs existed, that, in addition to offsite dose assessments, would require continual assessments of radioactive inventory and containment integrity. Alternatively, if both Fuel Clad and RCS "Potential Loss" EALs existed, the Emergency Coordinator/EOF Director would have more assurance that there was no immediate need to escalate to a General Emergency.

- The ability to escalate to higher emergency classes as an event deteriorates must be maintained. For example, RCS leakage steadily increasing would represent an increasing risk to public health and safety.

  a. Fission Product Barrier ICs must be capable of addressing event dynamics. Thus, the Note associated with the ICs in the EAL Matrix provides guidance that imminent (i.e., within 1 to 2 hours) Loss or Potential Loss should result in a classification as if the affected threshold(s) are already exceeded, particularly for the higher emergency classes.

FISSION PRODUCT BARRIER DEGRADATION

RCS Barrier Emergency Action Levels:

The RCS Barrier includes the RCS primary side and its connections up to and including the pressurizer safety and relief valves, and other connections up to and including the primary isolation valves.

RCS Leak Rate (RCB1)

Loss: RCS leak rate GREATER THAN available makeup capacity as indicated by RCS subcooling < 28º F.

Potential Loss: Unisolable RCS leak > 44 gpm.

Basis:

The “Loss” EAL addresses conditions where leakage from the RCS is greater than available inventory control capacity such that a loss of subcooling has occurred. The loss of subcooling is the fundamental indication that the inventory control systems are inadequate in maintaining RCS pressure and inventory against the mass loss through the leak.

The “Potential Loss” EAL is based on the inability to maintain normal liquid inventory within the RCS by normal operation of the Chemical and Volume Control System which is considered as one charging pump discharging to the charging header. A second charging pump being required is indicative of a substantial RCS leak.

FISSION PRODUCT BARRIER DEGRADATION

RCS Barrier Emergency Action Levels:

SG Tube Rupture (RCB2)

Loss: SGTR that results in an ECCS (SI) actuation

Potential Loss: Not Applicable

Basis:

This EAL is intended to address the full spectrum of Steam Generator (SG) tube rupture events in conjunction with Containment Barrier "Loss" EAL **CNB3** and Fuel Clad Barrier EALs. The "Loss" EAL addresses RUPTURED SG(s) for which the leakage is large enough to cause actuation (either automatic or manual) of ECCS (SI). This is consistent to the RCS Barrier "Potential Loss" EAL **RCB1**. By itself, this EAL will result in the declaration of an Alert. However, if the SG is also FAULTED (i.e., two barriers failed), the declaration escalates to a Site Area Emergency in accordance with Containment Barrier "Loss" EAL **CNB3**.

There is no "Potential Loss" EAL.

FISSION PRODUCT BARRIER DEGRADATION

RCS Barrier Emergency Action Levels:

Containment Radiation Monitoring (RCB3)

Loss: Containment High Range Radiation Monitor (ARM-IRE-5400AS or ARM-IRE-5400BS) > 100 R/hr.

Potential Loss: Not Applicable

Basis:

The specific radiation monitor reading is a value which indicates the release of reactor coolant to the containment. The reading was calculated assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with normal operating concentrations (i.e., within Technical Specifications) into the containment atmosphere. Reference Waterford 3 Engineering Calculation EC-S03-008. Source documents used for the determination of this monitor reading are NUREG 1228, "Source Term Estimation During Incident Response to Severe Nuclear Power Plant Accidents" and EC-S98-002, "Waterford 3 Chapter 15 Non-LOCA Dose Calculation." This reading is less than that specified for Fuel Clad Barrier EAL **FCB4**. Thus, this EAL is indicative of a RCS leak only. If the radiation monitor reading increased to that specified by Fuel Clad Barrier EAL **FCB4**, then fuel damage is indicated.

There is no "Potential Loss" EAL associated with this item.

FISSION PRODUCT BARRIER DEGRADATION

RCS Barrier Emergency Action Levels:

Other Indications (RCB4)

Loss: Not Applicable

Potential Loss: RCS pressure dropping due to primary relief not reseating

Basis:

The setpoint for the pressurizer code safety valves is 2500 psia +/- 3%. Their purpose is to provide RCS overpressure protection. The safety valves pass sufficient pressurizer steam to limit the RCS pressure to 2750 psia (110 % of design) following a complete loss of turbine generator load without simultaneous reactor trip. In the event of a primary relief valve lifting and not reseating the loss of mass inventory of the RCS is large enough to uncover the core in a short period of time.
Source document: Technical Specifications sections 3.4.2.1 and 3.4.2.2.

FISSION PRODUCT BARRIER DEGRADATION

RCS Barrier Emergency Action Levels:

Other Indications (RCB)

Emergency Coordinator/EOF Director Judgment (RCB5)

Any condition in the opinion of the Emergency Coordinator/EOF Director that indicates Loss or Potential Loss of the RCS Barrier.

Basis:

This EAL addresses any other factors that are to be used by the Emergency Coordinator/EOF Director in determining whether the RCS barrier is lost or potentially lost. An event or multiple events could occur which result in the conclusion that exceeding the loss or potential loss thresholds is imminent (i.e., within 1 to 2 hours). In this imminent loss situation, use judgment and classify as if the thresholds are exceeded. In addition, the inability to monitor the barrier should also be incorporated in this EAL as a factor in Emergency Coordinator/EOF Director judgment that the barrier may be considered lost or potentially lost. *(See also SG1, "Prolonged Loss of All Offsite Power and Prolonged Loss of All Onsite AC Power", for additional information.)*

SYSTEM MALFUNCTION

SS1

Initiating Condition -- SITE AREA EMERGENCY

Loss of all offsite power and loss of all onsite AC power to essential busses.

Operating Mode Applicability:

Power Operations (Mode 1)
Startup (Mode 2)
Hot Standby (Mode 3)
Hot Shutdown (Mode 4)

Emergency Action Level(s):

1. Loss of power to all unit auxiliary and startup transformers

AND

Failure of the 'A' and 'B' emergency diesel generators to supply power to emergency busses

AND

Failure to restore power to at least one emergency bus within 15 minutes from the time of loss of both offsite and onsite AC power.

Basis:

Loss of all AC power compromises all plant safety systems requiring electric power including Shutdown Cooling, ECCS, Containment Heat Removal and the Ultimate Heat Sink. Prolonged loss of all AC power will cause core uncovering and loss of containment integrity, thus this event can escalate to a General Emergency.

Escalation to General Emergency is via Fission Product Barrier Degradation (F) or SG1, "Prolonged Loss of All Offsite Power and Prolonged Loss of All Onsite AC Power."

Consideration should be given to operable loads necessary to remove decay heat or provide Reactor Vessel makeup capability when evaluating loss of AC power to essential busses. Even though an essential bus may be energized, if necessary loads (i.e., loads that if lost would inhibit decay heat removal capability or Reactor Vessel makeup capability) are not operable on the energized bus, then the bus should not be considered operable for this IC. If this bus was the only energized bus, then a Site Area Emergency in accordance with SS1 should be declared.

SYSTEM MALFUNCTION

SS1

Loss of all offsite power varies depending on the plant mode and source transformers. If the unit is back feeding via the unit Auxiliary Transformers and offsite power is lost in conjunction with loss of onsite AC power from the emergency diesel generators, then declaration of a Site Area Emergency is warranted.

When temporary emergency diesels (TEDs) are used to supplement onsite AC power for essential busses in the event diesels are lost, they are credited in this EAL. The EAL condition does not apply unless the TED also failed, provided the TED powers necessary loads as described above.

SYSTEM MALFUNCTION

SG1

Initiating Condition -- GENERAL EMERGENCY

Prolonged loss of all offsite power and prolonged loss of all onsite AC power to essential busses.

Operating Mode Applicability: **Power Operations (Mode 1)**
Startup (Mode 2)
Hot Standby (Mode 3)
Hot Shutdown (Mode 4)

Emergency Action Level(s):

1. Loss of power to all unit auxiliary and startup transformers.

AND

Failure of both 'A' and 'B' emergency diesel generators to supply power to emergency busses.

AND

Either of the following: (a or b)

a. Restoration of at least one emergency bus within 4 hours is not likely

OR

b. FA1 entry conditions met.

Basis:

Loss of all AC power compromises all plant safety systems requiring electric power including Shutdown Cooling, ECCS, Containment Heat Removal and the Ultimate Heat Sink. Prolonged loss of all AC power will lead to loss of fuel clad, RCS, and containment.

This IC is specified to assure that in the unlikely event of a prolonged station blackout, timely recognition of the seriousness of the event occurs and that declaration of a General Emergency occurs as early as is appropriate, based on a reasonable assessment of the event trajectory. The likelihood of restoring **at least one** emergency bus should be based on a realistic appraisal of the situation since a delay in an upgrade decision based on only a chance of mitigating the event could result in a loss of valuable time in preparing and implementing public protective actions. The 4 hours to restore AC power is based on the site blackout coping analysis performed in conformance with 10 CFR 50.63 and Regulatory Guide 1.155, "Station Blackout."

SYSTEM MALFUNCTION

SG1

Appropriate allowance for offsite emergency response, including evacuation of surrounding areas has been considered. Although this EAL may be viewed as redundant to the Fission Product Barrier Degradation (FG1) EALs, its inclusion is necessary to better assure timely recognition and emergency response.

When temporary emergency diesels (TEDs) are used to supplement onsite AC power for essential busses in the event diesels are lost, they are credited in this EAL.

In addition, under these conditions, fission product barrier monitoring capability may be degraded. Although it may be difficult to predict when power can be restored, it is necessary to give the Emergency Coordinator/EOF Director a reasonable idea of how quickly (s)he may need to declare a General Emergency based on two major considerations:

1. Are there any present indications that core cooling is already degraded to the point that Loss or Potential Loss of Fission Product Barriers is imminent?

2. If there are no present indications of such core cooling degradation, then how likely is it that power can be restored in time to assure that a loss of two barriers with a potential loss of the third barrier can be prevented?

Thus, indication of continuing core cooling degradation must be based on Fission Product Barrier monitoring with particular emphasis on Emergency Coordinator/EOF Director judgment as it relates to imminent Loss or Potential Loss of fission product barriers and degraded ability to monitor fission product barriers using the barrier indicators in section F of the EALs.

Facility:	**WATERFORD 3**	Date of Examination:	**October 5, 2009**
Exam Level (circle one):	**RO**	Operating Test No.:	1

Control Room Systems@ (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

	System / JPM Title	Type Code*	Safety Function
S1	001 Control Rod Drive; ATC Operator Immediate Operator Actions on 2 Dropped CEAs from OP-901-102, CEA or CEDMCS Malfunction Fault: The first and second reactor trip options do not function, requires performance of the 2nd reactor trip contingency from EOP OP-902-000, Standard Post Trip Actions.	A, S, D	1
S2	004 Chemical and Volume Control; VCT Makeup Using the Dilute makeup Mode Fault: PMU-144, Primary Makeup Water Control Valve, will not auto close when Primary Makeup Water Batch Counter counts down to zero.	A, L, S, M	2
S3	006 Emergency Core Cooling System; BOP Operator Actions on RAS This is a time critical task performed in EOP OP-902-002, Loss of Coolant Accident Recovery Procedure.	L, P, S, EN, D	3
S4	005 Shutdown Cooling System / 0025 E/APE Loss of Shutdown Cooling; Place Shutdown Cooling Train B in Service Fault: After LPSI Pump B is running, SI-405 B will fail closed, requiring the operator to take immediate operator actions IAW OP-903-130, Shutdown Cooling Malfunction, to secure LPSI Pump B.	A, L, S, M	4 - P
S5	022 Containment Cooling System; Perform OP-903-037, Containment Cooling Fans Operability Verification	S, D	5
S6	062 AC Electrical Distribution System, Energize 4.16 KV Safety Bus from Offsite Power This task will re-energize the 3A Bus with EDG A powering the 3A Bus using OP-902-009, Standard Appendices, Attachment 12-B.	L, S, D	6
S7.	012 Reactor Protection System; Remove Reactor Trip on Turbine Trip from Service using OP-004-015, Reactor Power Cutback System, and place Reactor Power Cutback in Service. Fault: When Reactor Power Cutback is placed in service, a Reactor Power Cutback will occur. The student will then need to take the immediate operator actions for Reactor Power Cutback.	A, S, M	7
S8	029 Containment Purge System; Secure Containment Purge using OP-002-010, Reactor Auxiliary Building HVAC and Containment Purge	S, D	8

In-Plant Systems[@] (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)			
P1	061 Emergency Feedwater; Transfer EFW Pump Suctions to Wet Cooling Tower after Condensate Storage Pool Depletion using EOP OP-902-009, Standard Appendices, Attachment 10	E, L, R, D	4 - S
P2	064 Electrical Diesel Generators, Reset EDG A following an overspeed trip with a LOOP. Reset is accomplished with OP-009-002, Emergency Diesel Generator, Section 8.8.	E, L, R, D	6
P3	006 Emergency Core Cooling System (ECCS), Align HPSI Pump AB for performance of OP-903-030, Safety Injection Pump Operability Verification. Fault: Reach rod for SI-208 A will bottom out during valve alignment, requiring contingencies of EN-OP-115, Conduct of Operations.	A, R, M	2

@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 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 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1
(EN)gineered safety feature	- / - / ≥1 (control room system)
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)
(R)CA	≥ 1 / ≥ 1 / ≥ 1
(S)imulator	

Facility:	**WATERFORD 3**	Date of Examination:	**October 5, 2009**
Exam Level (circle one):	**SRO - I**	Operating Test No.:	1

Control Room Systems@ (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

	System / JPM Title	Type Code*	Safety Function
S1	001 Control Rod Drive; ATC Operator Immediate Operator Actions on 2 Dropped CEAs from OP-901-102, CEA or CEDMCS Malfunction Fault: The first and second reactor trip options do not function, requires performance of the 2nd reactor trip contingency from EOP OP-902-000, Standard Post Trip Actions.	A, S, D	1
S2			
S3	006 Emergency Core Cooling System; BOP Operator Actions on RAS This is a time critical task performed in EOP OP-902-002, Loss of Coolant Accident Recovery Procedure.	L, P, S, EN, D	3
S4	005 Shutdown Cooling System / 0025 E/APE Loss of Shutdown Cooling; Place Shutdown Cooling Train B in Service Fault: After LPSI Pump B is running, SI-405 B will fail closed, requiring the operator to take immediate operator actions IAW OP-903-130, Shutdown Cooling Malfunction, to secure LPSI Pump B.	A, L, S, M	4 - P
S5	022 Containment Cooling System; Perform OP-903-037, Containment Cooling Fans Operability Verification	S, D	5
S6	062 AC Electrical Distribution System, Energize 4.16 KV Safety Bus from Offsite Power This task will re-energize the 3A Bus with EDG A powering the 3A Bus using OP-902-009, Standard Appendices, Attachment 12-B.	L, S, D	6
S7.	012 Reactor Protection System; Remove Reactor Trip on Turbine Trip from Service using OP-004-015, Reactor Power Cutback System, and place Reactor Power Cutback in Service. Fault: When Reactor Power Cutback is placed in service, a Reactor Power Cutback will occur. The student will then need to take the immediate operator actions for Reactor Power Cutback.	A, S, M	7
S8	029 Containment Purge System; Secure Containment Purge using OP-002-010, Reactor Auxiliary Building HVAC and Containment Purge	S, D	8

In-Plant Systems[@] (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)			
P1	061 Emergency Feedwater; Transfer EFW Pump Suctions to Wet Cooling Tower after Condensate Storage Pool Depletion using EOP OP-902-009, Standard Appendices, Attachment 10	E, L, R, D	4 - S
P2	064 Electrical Diesel Generators, Reset EDG A following an overspeed trip with a LOOP. Reset is accomplished with OP-009-002, Emergency Diesel Generator, Section 8.8.	E, L, R, D	6
P3	006 Emergency Core Cooling System (ECCS), Align HPSI Pump AB for performance of OP-903-030, Safety Injection Pump Operability Verification. Fault: Reach rod for SI-208 A will bottom out during valve alignment, requiring contingencies of EN-OP-115, Conduct of Operations.	A, R, M	2

@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 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 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1
(EN)gineered safety feature	- / - / ≥1 (control room system)
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)
(R)CA	≥ 1 / ≥ 1 / ≥ 1
(S)imulator	

Facility:	**WATERFORD 3**	Date of Examination:	**October 5, 2009**
Exam Level (circle one):	**SRO - U**	Operating Test No.:	1

Control Room Systems@ (8 for RO); (7 for SRO-I); (2 or 3 for SRO-U, including 1 ESF)

System / JPM Title		Type Code*	Safety Function
S1			
S2			
S3	006 Emergency Core Cooling System; BOP Operator Actions on RAS This is a time critical task performed in EOP OP-902-002, Loss of Coolant Accident Recovery Procedure.	L, P, S, EN, D	3
S4	005 Shutdown Cooling System / 0025 E/APE Loss of Shutdown Cooling; Place Shutdown Cooling Train B in Service Fault: After LPSI Pump B is running, SI-405 B will fail closed, requiring the operator to take immediate operator actions IAW OP-903-130, Shutdown Cooling Malfunction, to secure LPSI Pump B.	A, L, S, M	4 - P
S5			
S6			
S7.	012 Reactor Protection System; Remove Reactor Trip on Turbine Trip from Service using OP-004-015, Reactor Power Cutback System, and place Reactor Power Cutback in Service. Fault: When Reactor Power Cutback is placed in service, a Reactor Power Cutback will occur. The student will then need to take the immediate operator actions for Reactor Power Cutback.	A, S, M	7
S8			

In-Plant Systems[@] (3 for RO; 3 for SRO-I; 3 or 2 for SRO-U)			
P1			
P2	064 Electrical Diesel Generators, Reset EDG A following an overspeed trip with a LOOP. Reset is accomplished with OP-009-002, Emergency Diesel Generator, Section 8.8.	E, L, R, D	6
P3	006 Emergency Core Cooling System (ECCS), Align HPSI Pump AB for performance of OP-903-030, Safety Injection Pump Operability Verification. Fault: Reach rod for SI-208 A will bottom out during valve alignment, requiring contingencies of EN-OP-115, Conduct of Operations.	A, R, M	2

@ All RO and SRO-I control room (and in-plant) systems must be different and serve different safety functions; all 5 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 / 4-6 / 2-3
(C)ontrol room	
(D)irect from bank	≤ 9 / ≤ 8 / ≤ 4
(E)mergency or abnormal in-plant	≥ 1 / ≥ 1 / ≥ 1
(EN)gineered safety feature	- / - / ≥1 (control room system)
(L)ow-Power / Shutdown	≥ 1 / ≥ 1 / ≥ 1
(N)ew or (M)odified from bank including 1(A)	≥ 2 / ≥ 2 / ≥ 1
(P)revious 2 exams	≤ 3 / ≤ 3 / ≤ 2 (randomly selected)
(R)CA	≥ 1 / ≥ 1 / ≥ 1
(S)imulator	

Waterford 3

2009 NRC Exam

JOB PERFORMANCE MEASURE

S1

ATC Immediate Operator Actions on 2 Dropped CEAs

Applicant: _____

Examiner: _____

JOB PERFORMANCE MEASURE
DATA PAGE

Task: ATC Immediate Operator Actions on 2 Dropped CEAs

Task Standard: Applicant trips reactor using 32 A and 32 B breakers and completes the ATC operator's Standard Post Trip Actions.

References: OP-901-102, CEA or CEDMCS Malfunction
OP-902-000, Standard Post Trip Actions

Validation Time: 5 minutes Time Critical: No

Alternate Path: Yes

Applicant: _____

Time Start: _____ Time Finish: _____

Performance Time: _____ minutes

Performance Rating: SAT UNSAT

Comments: _____

_____

_____

_____

_____

Examiner: _____ Date: _____
Signature

EXAMINER COPY ONLY

Tools/Equipment/Procedures Needed:

None

Description:
Applicant will position himself as the ATC operator at CP-2. CEAs 3 and 14 will drop into the core. The applicant should notice the condition, announce the condition, and trip the reactor without direction. The normal reactor trip pushbuttons will not function. The applicant should move to the first contingency and use the Diverse Reactor Trip pushbuttons. One of these buttons is faulted. The DRTS alarms will come in, but the CEA MG set load contactors will not open. The applicant should then move to the second contingency, and open both 32 Bus Feeder breakers, and reclose them 5 seconds later. The task should be stopped after the applicant completes the immediate operator actions for the ATC position.

READ TO APPLICANT

DIRECTION TO APPLICANT:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Indicate to me when you understand your assigned task.

INITIAL CONDITIONS:

- The plant is at 100% power.

INITIATING CUES:

- Respond to conditions observed.
- Perform actions as required by the ATC operator.

Simulator Operator: Initiate trigger 1 on direction for examiner.

TASK ELEMENT	STANDARD
Determines 2 CEAs have dropped, attempts to trip the reactor from CP-2.	Pushes both reactor trip pushbuttons on CP-2.
Comment: Trip pushbuttons are faulted and Reactor Trip Circuit Breakers will not open.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Attempts to trip reactor using DRTS pushbuttons on CP-2.	Pushes both DRTS pushbuttons on CP-2.
Comment: 1 DRTS pushbutton is faulted and CEA MG set load contactors will not open.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Open **BOTH** the following breakers for 5 seconds and close: • SST A32 FEEDER • SST B32 FEEDER	Opens SST A32 FEEDER and SST B32 FEEDER breakers for 5 seconds and then re-closes both breakers.
Comment: Evaluator: If applicant stops after re-closing the A and B 32 Feeder breakers, prompt him as the CRS to perform his Standard Post Trip Actions.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Determine Reactivity Control acceptance criteria are met: • Check reactor power is dropping. • Check startup rate is negative. • Check less than **TWO** CEAs are **NOT** fully inserted.	Verifies listed parameters.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Determine RCS Inventory Control acceptance criteria are met: Check that the following conditions exist: • Pressurizer level is 7% to 60% • Pressurizer level is trending to 33% to 60% • Check RCS subcooling is greater than or equal to 2 8ºF.	Verifies listed parameters.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Determine RCS Pressure Control acceptance criteria are met by checking that **BOTH** of the following conditions exist: • Pressurizer pressure is 1750 psia to 2300 psia • Pressurizer pressure is trending to 2125 psia to 2275 psia	Verifies listed parameters.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Determine Core Heat Removal acceptance criteria are met: • Check at least one RCP is operating. • Check operating loop ΔT is less than 13 ºF. • Check RCS subcooling is greater than or equal to 28 ºF.	Verifies listed parameters.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Determine RCS Heat Removal acceptance criteria are met: • Check RCS T_{COLD} is 530 ºF to 550 ºF	Verifies listed parameters.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Determine Containment Isolation acceptance criteria are met: • Check containment pressure is less than 16.4 psia. • Check **NO** containment area radiation monitor alarms **OR** unexplained rise in activity. • Check **NO** steam plant activity monitor alarms **OR** unexplained rise in activity.	Verifies listed parameters.
Comment:	**Critical** **SAT / UNSAT**

END OF TASK

APPLICANT CUE SHEET

(TO BE RETURNED TO EXAMINER TO UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

- The plant is at 100% power.

INITIATING CUES:

- Respond to conditions observed.
- Perform actions as required by the ATC operator.

SIMULATOR OPERATOR INSTRUCTIONS

Reset to IC-97

Verify the following Malfunctions:

- No Trigger
  - rp01a, RPS manual pushbutton a
  - rp01b, RPS manual pushbutton b
  - rp01c, RPS manual pushbutton c
  - rp01d, RPS manual pushbutton d

- Trigger 1:
  - rd02a03, drop CEA 3
  - rd02a14, drop CEA 14

Verify the following Overrides:

- No Trigger
  - di-02a06s02-1, DRT pushbutton 1 of 2

Coordinate with examiner to initiate Trigger 1 on his cue.

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CONTINUOUS USE

D IMMEDIATE OPERATOR ACTIONS

1. If in Mode 1 and two or more Control Element Assemblies drop or are misaligned by >19 inches, then manually trip the Reactor and go to OP-902-000, Standard Post Trip Actions.

Emergency Operating Procedure
OP-902-000
Standard Post Trip Actions

OSRC Meeting No.: 05-014

Reviewed by: R Dodds III
OSRC Chairman

Approved by: 3/14/05
General Manager - Plant Operations

Approval Date

* 5/3/2005
Effective Date

* Implementation of license amendment request NPF-38-249.

Continuous Use

1.0 PURPOSE

This procedure provides the immediate operator actions which must be accomplished after a reactor trip has occurred or is required to have occurred. These actions are necessary to ensure that the plant is placed in a stable, safe condition or that the plant is configured to respond to a continuing emergency. The immediate actions are performed when entering this procedure during Modes 1 or 2.

End of Section 1.0

2.0 ENTRY CONDITIONS

The Standard Post Trip Actions may be entered when **ANY** or **ALL** of the following symptom(s) of a Reactor Trip exist:

- CEA bottom lights on
- Rapid drop in reactor power
- Reactor trip circuit breakers open
- RPS trip setpoint exceeded

End of Section 2.0

3.0 EXIT CONDITIONS

1. **ALL** safety function acceptance criteria are met, **AND** no contingency actions were performed.

   OR

2. **ANY** safety function acceptance criteria are **NOT** met, **OR ANY** contingency action was taken.

End of Section 3.0

4.0 INSTRUCTIONS/CONTINGENCY ACTIONS

INSTRUCTIONS	CONTINGENCY ACTIONS
Verify Reactivity Control	
___1. Determine Reactivity Control acceptance criteria are met:	
___a. Check reactor power is dropping.	a.1 Perform the following as necessary to insert CEAs: 1) Manually trip the reactor. 2) Manually initiate DIVERSE REACTOR TRIP. 3) Open **BOTH** the following breakers for 5 seconds and close: • SST A32 FEEDER • SST B32 FEEDER
___b. Check startup rate is negative.	
___c. Check less than **TWO** CEAs are **NOT** fully inserted.	c.1 Commence emergency boration.

INSTRUCTIONS	CONTINGENCY ACTIONS
Verify Maintenance of Vital Auxiliaries	
___2. Determine that Maintenance of Vital Auxiliaries acceptance criteria are met:	
___a. Check the Main Turbine is tripped: • Governor valves closed • Throttle valves closed	a.1 Perform **ANY** of the following: 1) Manually trip the Main Turbine using TURBINE TRIP and THINK pushbuttons. 2) Close **BOTH** MSIVs.
___b. Check the Main Generator is tripped: • GENERATOR BREAKER A tripped • GENERATOR BREAKER B tripped • EXCITER FIELD BREAKER tripped (continue)	b.1 Perform **ANY** of the following: 1) Manually trip the Main Generator using **BOTH** GENERATOR EMERG TRIP pushbuttons. 2) Manually trip the Main Generator by performing **ALL** of the following: a. Transfer **BOTH** electrical buses from UAT to SUT. b. Open the following breakers: • GENERATOR BREAKER A • GENERATOR BREAKER B • EXCITER FIELD BREAKER

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	
___c. Check station loads are energized from offsite electrical power as follows: **Train A** • A1, 6.9 KV non safety bus • A2, 4.16 KV non safety bus • A3, 4.16 KV safety bus • A-DC electrical bus • A or C vital AC Instrument Channel **Train B** • B1, 6.9 KV non safety bus • B2, 4.16 KV non safety bus • B3, 4.16 KV safety bus • B-DC electrical bus • B or D vital AC Instrument Channel	c.1 **IF ANY** 4.16 KV safety bus is **NOT** powered from offsite, **THEN:** 1) Verify the associated emergency diesel generator has started. 2) Verify the associated emergency diesel generator output breaker is closed.

INSTRUCTIONS	CONTINGENCY ACTIONS
Verify RCS Inventory Control	
___3. Determine RCS Inventory Control acceptance criteria are met:	
___a. Check that **BOTH** of the following conditions exist: • Pressurizer level is 7% to 60% • Pressurizer level is trending to 33% to 60%	a.1 Restore and maintain pressurizer level 33% to 60% by performing **ANY** of the following: 1) Operate Pressurizer Level Control System. 2) Manually operate charging pumps and letdown control valves.
___b. Check RCS subcooling is greater than or equal to 28ºF.	

INSTRUCTIONS	CONTINGENCY ACTIONS
Verify RCS Pressure Control	
___4. Determine RCS Pressure Control acceptance criteria are met by checking that **BOTH** of the following conditions exist: • Pressurizer pressure is 1750 psia to 2300 psia • Pressurizer pressure is trending to 2125 psia to 2275 psia	4.1 Restore and maintain pressurizer pressure 2125 psia to 2275 psia by performing **ANY** of the following: a. Operate Pressurizer Pressure Control System. b. Manually operate heaters and spray. 4.2 **IF** pressurizer pressure is less than 1684 psia, **THEN** verify the following have initiated. • SIAS • CIAS 4.3 **IF** pressurizer pressure is less than 1621 psia, **THEN** verify no more than two RCPs are operating. 4.4 **IF** pressurizer pressure is less than the minimum RCP NPSH of Appendix 2-A, "RCS Pressure and Temperature Limits", **THEN** stop **ALL** RCPs.

INSTRUCTIONS	CONTINGENCY ACTIONS
Verify Core Heat Removal	
___5. Determine Core Heat Removal acceptance criteria are met:	
___a. Check at least one RCP is operating.	
___b. Check operating loop ΔT is less than 13ºF.	
___c. Check RCS subcooling is greater than or equal to 28ºF.	
Verify RCS Heat Removal	
___6. Determine RCS Heat Removal acceptance criteria are met:	
___a. Check that at least one steam generator has **BOTH** of the following: • Steam generator level is 5% to 80% NR • Main Feedwater is available to restore level within 50%-70% NR **[60-80% NR]**	a.1 Verify Main Feedwater is restoring level in at least one steam generator within 50% to 70% NR **[60% to 80% NR]**. a.2 Verify Emergency Feedwater is available to restore level in at least one steam generator within 50%-70% NR **[60-80% NR]**.

(continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
6. (continued)	
___ b. Check RCS T_C is 530ºF to 550ºF (continue)	b.1 **IF** RCS T_C is greater than 550ºF, **THEN** confirm that at least one steam generator is removing RCS heat: • Verify level is being restored to at least one steam generator • Verify Steam Bypass or ADVs are restoring RCS T_C 530ºF to 550ºF b.2 **IF** RCS T_C is less than 530ºF, **THEN** perform the following: • Verify feedwater flow is **NOT** excessive • Verify Steam Bypass or ADVs are restoring RCS T_C 530ºF to 550ºF • **IF** RCS T_C is less than 382ºF, **THEN** verify no more than two RCPs are operating • **IF** RCS T_C is being controlled by an ESD, **THEN** REFER TO Appendix 13, "Stabilize RCS Temperature" and stabilize RCS temperature using the least affected steam generator

INSTRUCTIONS	CONTINGENCY ACTIONS
6. (continued)	
___c. Check steam generator pressure is 885 psia to 1040 psia.	c.1 **IF** steam generator pressure is less than 885 psia, **THEN** perform **ALL** of the following: 1) Verify steam bypass valves are closed. 2) Verify ADVs are closed. c.2 **IF** steam generator pressure is less than or equal to 666 psia, **THEN** verify MSIS is initiated. c.3 **IF** steam generator pressure is greater than 1040 psia, **THEN** verify that Steam Bypass or ADVs are restoring steam generator pressure to less than 1040 psia.
___d. Check Feedwater Control in Reactor Trip Override: • MAIN FW REG valves are closed • STARTUP FW REG valves are 13% to 21% open • Operating main feedwater pumps are 3800 rpm to 4000 rpm	d.1 Manually operate the Feedwater Control system and restore level in at least one steam generator within 50% to 70% NR **[60%-80% NR]**.
(continue)	

INSTRUCTIONS	CONTINGENCY ACTIONS
6. (continued)	
___e. Reset moisture separator reheaters, and check the temperature control valves closed.	e.1 Isolate the moisture separator reheaters by locally closing the air operated temperature control valves.
Verify Containment Isolation	
___7. Determine Containment Isolation acceptance criteria are met:	
___a. Check containment pressure is less than 16.4 psia.	a.1 **IF** containment pressure is greater than or equal to 17.1 psia, **THEN** verify the following: • CIAS is initiated • SIAS is initiated • MSIS is initiated
___b. Check **NO** containment area radiation monitor alarms **OR** unexplained rise in activity.	
___c. Check **NO** steam plant activity monitor alarms **OR** unexplained rise in activity.	

INSTRUCTIONS	CONTINGENCY ACTIONS
Verify Containment Temperature and Pressure Control	
___8. Determine Containment Temperature and Pressure Control acceptance criteria are met:	
___a. Check containment temperature is less than or equal to 120ºF.	8.1 Verify at least three containment fan coolers are operating.
___b. Check containment pressure is less than 16.4 psia.	8.2 **IF** containment pressure is greater than or equal to 17.1 psia, **THEN** verify **ALL** available containment fan coolers are operating in emergency mode.
	8.3 **IF** containment pressure is greater than or equal to 17.7 psia, **THEN** verify **ALL** of the following: • CSAS is initiated • **ALL** available containment spray pumps are delivering flow greater than 1750 gpm • **ALL** RCPs are secured
Verify ALL Safety Function Acceptance Criteria Are Met	
___9. **IF ALL** safety function acceptance criteria are met, **AND NO** contingency actions were performed, **THEN** GO TO OP-902-001, "Reactor Trip Recovery" procedure.	

INSTRUCTIONS	CONTINGENCY ACTIONS
Direct Diagnostic Action	
___10. **IF ANY** safety function acceptance criteria are **NOT** met, **OR ANY** contingency action was taken, **THEN** GO TO Appendix 1, "Diagnostic Flowchart."	

End of Section 4.0

Waterford 3

2009 NRC Exam

JOB PERFORMANCE MEASURE

S2

Volume Control Tank Makeup Using the Dilute Makeup Mode

Applicant: _____

Examiner: _____

JOB PERFORMANCE MEASURE
DATA PAGE

Task: Volume Control Tank Makeup Using the Dilute Makeup Mode

Task Standard: Applicant adds Primary Makeup to the VCT and secures PMU flow to the VCT.

References: OP-002-005, Chemical and Volume Control

Validation Time: 15 minutes Time Critical: No

Alternate Path: Yes

Applicant: _____

Time Start: _____ Time Finish: _____

Performance Time: _____ minutes

Performance Rating: SAT UNSAT

Comments: _____

_____

_____

_____

_____

Examiner: _____ Date: _____
Signature

EXAMINER COPY ONLY

Tools/Equipment/Procedures Needed:

OP-002-005, Chemical and Volume Control

Description:
This task is performed at CP-4. The applicant will makeup to the Volume Control Tank in the dilute mode. Step 6.9.2 directs the operator to calculate volume of Primary Makeup water to be added at the discretion of the SM/CRS. The applicant will be directed to add 250 gallons of Primary Makeup. This calculation will not be applicable. The fault in this JPM is on the automatic termination feature of the PMU Batch Counter. When the required amount of PMU has been added, the PMU will continue flowing. The applicant will be required to manually secure PMU flow.

This task is typically peer checked by another operator and observed by a SRO. Inform the applicant that all required personnel are present.

READ TO APPLICANT

DIRECTION TO APPLICANT:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Indicate to me when you understand your assigned task.

INITIAL CONDITIONS:

- The Plant is in Mode 4
- The Control Room Supervisor has determined that a 250 gallon dilution of the RCS is required

INITIATING CUES:

- The CRS directs you to add 250 gallons of Primary Makeup to the Volume Control Tank.

TASK ELEMENT	STANDARD
Procedure Caution: This section affects reactivity. This evolution should be cross checked and completed prior to leaving CP-4.	Applicant does not tend to other panels during task.
Comment: Evaluator: Inform applicant that all required personnel are observing.	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.9.1: Inform SM/CRS that this Section is being performed.	Notification is made.
Comment: Evaluator: Acknowledge that PMU addition is about to commence.	**SAT / UNSAT**

TASK ELEMENT	STANDARD
At SM/CRS discretion, calculate volume of Primary Makeup water to be added on Attachment 11.7, Calculation of Primary Makeup Water Volume for Direct Dilution or VCT Dilute Makeup Mode.	N/A
Comment: Evaluator: Inform the applicant that the CRS has given him permission to mark that step not applicable, N/A. The CRS directs the ATC operator to add 250 gallons of Primary Makeup, as stated on the Applicant Cue Sheet.	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.9.3: Set Primary Makeup Water Batch Counter to 250 gallons as follows: Operation of the PMU Batch Counter: • Press UP arrow • Press ENTER • Enter 25 • Press ENTER • Press RESET	PMU counter set to “25”
Comment: Value of PMU entered into the counter is multiplied by 10. The procedure does not list the steps for operation of the PMU Batch Counter. There is an approved laminated instruction sheet on the operator cart for operation of this counter. Use of this sheet is not required, but is allowed.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
6.9.4: Place Makeup Mode selector switch to DILUTE.	Makeup Mode selector switch is in DILUTE
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
6.9.5: Open VCT Makeup Valve, CVC-510.	CVC-510 is open
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Procedure Note The Dilution Flow Totalizer will not register below 5 GPM. The Dilution Flow Totalizer is most accurate at > 10 GPM.	Note is placekept.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.9.6.1: Verify Primary Makeup Water Flow controller, PMU-IFIC-0210X, in Manual.	PMU-IFIC-0210X is placed in Manual
Comment: This step allows for controlling flow in manual or automatic. If asked, direct manual mode.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
6.9.6.2: Adjust Primary Makeup Water Flow controller, PMU-IFIC-0210X, output to > 5 GPM flow rate.	PMU flow is > 5 gpm
Comment: Evaluator: Allow applicant to adjust initial flow and mark if flow is < 5 gpm. Subsequently, prompt applicant to raise flow to > 50 gpm if initial flow is < 50 gpm for timeliness of JPM.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
6.9.8: Verify Primary Makeup Water Control Valve, PMU-144, Intermediate or Open.	PMU-144 is intermediate or open
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.9.9: Observe Primary Makeup water flow rate for proper indication.	Observes flow indication
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.9.10: Operate VCT Inlet/Bypass to Holdup Tanks, CVC-169 Control Switch to BMS/Auto positions as necessary to maintain VCT pressure and level within normal operating bands.	CVC-169 is operated as necessary
Comment: Based on VCT level in this IC, this step should be N/A. There would be no concern if the applicant chooses to operate CVC-169 to maintain VCT level and pressure constant.	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.9.11: When Primary Makeup Water Batch Counter has counted down to desired value, then verify Primary Makeup Water Control Valve, PMU-144, Closed.	PMU flow is stopped
Comment: This is the faulted step. When the counter counts to 0, flow will continue and the counter will begin to register negative numbers. The applicant can secure flow in 2 ways. 1 method would involve taking the controller for PMU-144 to 0 output (step 6.9.14). Another method would be to close CVC-510 (step 6.9.15). Either method is acceptable.	**Critical** **SAT / UNSAT**

If applicant stops following this step in the JPM, prompt applicant to complete restoration of the controls at CP-4.

TASK ELEMENT	STANDARD
6.9.13: Verify Primary Makeup Water Flow controller, PMU-IFIC-0210X, in Manual.	PMU-IFIC-0210X is in manual
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.9.14: Verify both Primary Makeup Water Flow controller, PMU-IFIC-0210X, output and setpoint potentiometer set to zero.	Both are set to 0
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
6.9.15: Close VCT Makeup Valve, CVC-510.	CVC-510 is closed
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
6.9.16: Place Makeup Mode selector switch to MANUAL.	Makeup Mode Select switch is in manual
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
6.9.17: Verify VCT Inlet/Bypass To Holdup Tanks, CVC-169, aligned to the VCT and control switch in AUTO.	CVC-169 is in auto
Comment: Applicant may not have positioned CVC-169, but if he did, it must be restored to Auto.	**SAT / UNSAT**

END OF TASK

APPLICANT CUE SHEET

(TO BE RETURNED TO EXAMINER TO UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

- The Plant is in Mode 4
- The Control Room Supervisor has determined that a 250 gallon dilution of the RCS is required

INITIATING CUES:

- The CRS directs you to add 250 gallons of Primary Makeup to the Volume Control Tank.

SIMULATOR OPERATOR INSTRUCTIONS

Reset to IC-95

Verify the following Malfunctions:

- cv35a for PMU batch counter

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MULTIPLE USE

3.0 PRECAUTIONS AND LIMITATIONS

3.1 PRECAUTIONS

3.1.1 Concentrated Boric Acid in unheated lines may precipitate if lines cool sufficiently.

3.1.2 RCS activity changes may occur when RCS chemical composition is altered (i.e. Crud Burst).

3.1.3 The reactivity effects of boration or dilution should be observed in terms of:

- Resulting CEA motion if CEDMCS is in Automatic Sequential mode
- Changes in source count rate
- Changes in Reactor Coolant Temperature
- Changes in Reactor Power

The following backup and redundant nuclear instrumentation and other reactor and plant indications may be used by Operators when making reactivity changes:

PARAMETER	INDICATORS
T_{Cold}	RC-ITI-0102CA, RC-ITI-0102CB, RC-ITI-0102CC, RC-ITI-0102CD
Linear Power	ENI-IJR-0002A, ENI-IJR-0002B, ENI-IJR-0002C, ENI-IJR-0002D
Core ΔT Power (BDELT)	C24104
Log power	ENI-IJR-0001, ENI-IJI-0001A, ENI-IJI-0001B, ENI-IJI-0001C, ENI-IJI-0001D
Startup Countrate	ENI-IJR-0005, ENI-IJI-0005, ENI-IJI-0006
Startup Rate	Startup rate meter on CP-2
Steam Bypass	MS-IHI-C0319A
Pressurizer Pressure (NR)	RC-IPI-0101A, RC-IPI-0101B, RC-IPI-0101C, RC-IPI-0101D
Pressurizer Pressure (WR)	RC-IPI-0102A, RC-IPI-0102B, RC-IPI-0102C, RC-IPI-0102D
PHICAL	CPC PID-171, Channels A, B, C, D
BDT	CPC PID-177, Channels A, B, C, D

3.1.4 Planned <u>power</u> <u>changes</u> are authorized by the Shift Manager. The necessary reactivity manipulations are then:

- Preceded by a brief
- Ordered by the SM/CRS
- Directly supervised by an SRO.

3.1.5 Reactivity manipulations to maintain power level are:

- Discussed by the ATC / BOP and SM/CRS (pertaining to expected power and temperature response)
- Ordered by the SM/CRS.

3.1.6 If any of the following occur, then prompt corrective action should be taken:

- Pre-Power Dependent Insertion Limit (H-9, Cabinet H) alarms
- CEAs or RCS temperature change in an unexpected manner
- High Linear Power Pre-Trip B/D (C-14, Cabinet K) alarms
- High Linear Power Pre-Trip A/C (B-14, Cabinet K) alarms

3.1.7 To minimize thermal transients in the system, Letdown and Charging flows should be started and stopped simultaneously.

3.1.8 When batching, adding chemicals, or filling an Ion Exchanger with resin, care should be taken to prevent foreign material from contaminating the Batching Tank, Chemical Addition Tank, Resin Addition Tank, Resin Slurry, or Granular Boric Acid.

3.1.9 An explosive mixture of hydrogen and air in the VCT shall be avoided at all times. The oxygen concentration should be maintained below 2% by volume as verified by VCT gas space samples.

3.1.10 Letdown temperatures downstream of the Letdown Heat Exchanger should be maintained ≤120°F to prevent degradation of the Ion Exchanger resin.

3.1.11 RCS boron concentration, RCS temperature, Reactor Power, and RCS Chemistry should be closely monitored when placing an Ion Exchanger in service.

3.1.12 Charging Pump pulsation dampeners should be pressurized using expected RCS pressure in accordance with OP-904-007, Charging Pump Pulsation Dampener Pressure Check.

3.1.13 To minimize thermal transients, Letdown flow should not be throttled below 10 GPM.

3.1.14 Prior to adding water, borating, or blending to the RWSP, the RWSP vent line should be drained of accumulated water in order to prevent excessive pressure buildup in the RWSP during fill and the possibility of rupturing the RWSP plug seal.

3.1.15 To minimize thermal shock of charging nozzles, only one Charging Pump should be started at a time.

3.1.16 When filling Ion Exchangers, Chemistry should ensure the correct type resin is used for the desired operation (purifying, delithiating or deborating).

3.1.17 Reactivity should be monitored for changes when Letdown temperature changes. Lowering letdown temperature may remove boron from Ion Exchanger effluent and raising letdown temperature may release boron into Ion Exchanger effluent.

3.1.18 During periods of maximum Letdown flow, Letdown header pressure may increase sufficiently to cause Letdown Header Relief Valve, CVC-126, to lift.

3.1.19 Any evolution at CP-4 affecting reactivity should be cross-checked and completed prior to leaving CP-4.

3.2 LIMITATIONS

3.2.1 If a change in Reactor Coolant Boron concentration of greater than or equal to 50 PPM occurs or is anticipated, then Boron Equalization should be performed in accordance with the applicable General Operating Procedure:

- OP-010-003, Plant Startup (Attachment 9.20)
- OP-010-004, Power Operations (Attachment 9.3)
- OP-010-005, Plant Shutdown (Attachment 9.12)

3.2.2 Chemistry and Radiation Protection Departments should be notified prior to initiating CVC operations that could impact chemical or radiological controls. These include but are not limited to:

- VCT purging and venting
- Starting or stopping Charging Pumps
- Placing Purification Ion Exchangers in or out of service
- Purification Ion Exchangers resin replacement

3.2.3 During Plant Mode changes, plant configuration shall meet the requirements of Technical Specification 3.1.2.9 prior to racking in Charging Pump breakers.

3.2.4 To ensure proper chemical mixing, with the RCS filled, at least one Reactor Coolant Pump in each loop should be operating prior to performing any boration or dilution operation.

3.2.5 Proper flow through the Charging Pump Seal System will extend Charging Pump packing life. The Charging Pump Seal System is not required for Charging Pump Operability.

3.2.6 The CVC Purification Filter will degrade when subjected to temperatures above 180°F for several hours. If Letdown Heat Exchanger Outlet Temperature reaches 140°F and can not be corrected within two hours, then the CVC Purification Filter should be removed from service and Chemistry notified.

3.2.7 To minimize the effects of RCP seal perturbations, maintain Reactor Coolant Pump Control Bleedoff Pressure 40 PSIG to 65 PSIG during normal operations. Reactor Coolant Pump Control Bleedoff Pressure operating band may be expanded to 30 PSIG to 120 PSIG during startup and shutdowns. In addition, the rate of backpressure change should not exceed 4 PSIG/minute. Refer to Attachment 11.20 for RCP Operating limits.

3.2.8 Attachment 11.17, Cycle _____ Boron/Dilution Addition Guidelines, is available to estimate boron and dilution additions. These guidelines are to be provided by Reactor Engineering for the current cycle.

3.2.9 In Modes 1 – 4, Penetration #27 (CVC) is subject to thermally induced overpressurization during a Design Basis Accident. Overpressurization relief is administratively provided by maintaining CVC-220, Charging To RC Loop 1A Bypass Isolation, Open. **[GL 96-06, CR-WF3-2004-00480, ER-W3-2004-0143-000]**

3.2.10 Do <u>not</u> exceed 95% indicated level in <u>either</u> BAM Tank A <u>or</u> B. **[EC-I92-001]**

6.9 VCT MAKEUP USING THE DILUTE MAKEUP MODE (C)

CAUTION

THIS SECTION AFFECTS REACTIVITY. THIS EVOLUTION SHOULD BE CROSS-CHECKED AND COMPLETED PRIOR TO LEAVING CP-4.

6.9.1 Inform SM/CRS that this Section is being performed.

NOTE

When performing a Plant down power where final RCS Boron Concentration needs to be determined, the following Plant Data Book figure(s) will assist the Operator in determining the required RCS Boron PPM change.

- 1.2.1.1 Power Defect Vs Power Level
- 1.4.3.1 Inverse Boron Worth Vs. T_{mod} at BOC (<30 EFPD)
- 1.4.4.1 Inverse Boron Worth Vs. T_{mod} at Peak Boron (30 EFPD up to 170 EFPD)
- 1.4.5.1 Inverse Boron Worth Vs. T_{mod} at MOC (170 EFPD up to 340 EFPD)
- 1.4.6.1 Inverse Boron Worth Vs. T_{mod} at EOC (≥340 EFPD)

6.9.2 At SM/CRS discretion, calculate volume of Primary Makeup water to be added on Attachment 11.7, Calculation of Primary Makeup Water Volume for Direct Dilution or VCT Dilute Makeup Mode.

6.9.3 Set Primary Makeup Water Batch Counter to volume of Primary Makeup water desired.

6.9.4 Place Makeup Mode selector switch to DILUTE.

6.9.5 Open VCT Makeup Valve, CVC-510.

NOTE

The Dilution Flow Totalizer will not register below 5 GPM. The Dilution Flow Totalizer is most accurate at > 10 GPM.

CAUTION

DILUTION SHALL IMMEDIATELY BE STOPPED IF PRE-POWER DEPENDENT INSERTION LIMIT (H-9, CABINET H) ALARM IS INITIATED OR ANY UNEXPECTED REACTIVITY CHANGE OCCURS.

6.9.6 If manual control of Primary Makeup Water flow is desired, then perform the following:

6.9.6.1 Verify Primary Makeup Water Flow controller, PMU-IFIC-0210X, in Manual.

6.9.6.2 Adjust Primary Makeup Water Flow controller, PMU-IFIC-0210X, output to > 5 GPM flow rate.

6.9.7 If automatic control of Primary Makeup Water flow is desired, then perform the following:

6.9.7.1 Place Primary Makeup Water Flow controller, PMU-IFIC-0210X, in Auto.

6.9.7.2 Adjust Primary Makeup Water Flow controller, PMU-IFIC-0210X, setpoint potentiometer to > 5 GPM flow rate.

6.9.8 Verify Primary Makeup Water Control Valve, PMU-144, Intermediate or Open.

6.9.9 Observe Primary Makeup water flow rate for proper indication.

6.9.10 Operate VCT Inlet/Bypass to Holdup Tanks, CVC-169 Control Switch to BMS/Auto positions as necessary to maintain VCT pressure and level within normal operating bands.

6.9.11 When Primary Makeup Water Batch Counter has counted down to desired value, then verify Primary Makeup Water Control Valve, PMU-144, Closed.

NOTE

Step 6.9.12 may be repeated as necessary to achieve desired total Primary Makeup Water addition for plant conditions.

6.9.12 If additional Primary Makeup Water addition is required and with SM/CRS permission, then perform the following:

6.9.12.1 Reset Primary Makeup Water Batch Counter.

6.9.12.2 Verify Primary Makeup Water Control Valve, PMU-144, Intermediate or Open.

6.9.12.3 Observe Primary Makeup water flow rate for proper indication.

6.9.12.4 When Primary Makeup Water Batch Counter has counted down to desired value, then verify Primary Makeup Water Control Valve, PMU-144, Closed.

6.9.13 Verify Primary Makeup Water Flow controller, PMU-IFIC-0210X, in Manual.

6.9.14 Verify both Primary Makeup Water Flow controller, PMU-IFIC-0210X, output and setpoint potentiometer set to zero.

6.9.15 Close VCT Makeup Valve, CVC-510.

6.9.16 Place Makeup Mode selector switch to MANUAL.

6.9.17 Verify VCT Inlet/Bypass To Holdup Tanks, CVC-169, aligned to the VCT and control switch in AUTO.

Waterford 3

2009 NRC Exam

JOB PERFORMANCE MEASURE

S3

Operator Actions on RAS Actuation

Applicant: _____

Examiner: _____

JOB PERFORMANCE MEASURE
DATA PAGE

Task: Operator Actions on RAS Actuation

Task Standard: Applicant completes actions required post RAS actuation.

References: OP-902-002, Loss of Coolant Accident Recovery

Validation Time: 15 minutes Time Critical: Yes

Alternate Path: No

Applicant: _____

Time Start: _____ Time Finish: _____

Performance Time: _____ minutes

Performance Rating: SAT UNSAT

Comments: _____

_____

_____

_____

_____

Examiner: _____ Date: _____
Signature

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Tools/Equipment/Procedures Needed:

OP-902-002, Loss of Coolant Accident Recovery

Description:
This task is performed at CP-8 and CP4. The applicant performs required manipulations after Recirculation Actuation is initiated. After the simulator is taken out of freeze, the RAS will initiate in < 1 minute.

This JPM has time critical elements. SI-120 A and B and SI-121 A and B must be closed within 2 minutes of RAS initiation to prevent recirculating SI sump water to the RWSP.

READ TO APPLICANT

DIRECTION TO APPLICANT:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Indicate to me when you understand your assigned task.

INITIAL CONDITIONS:

A loss of coolant accident is in progress.
RAS initiation is imminent.

INITIATING CUES:

- The CRS has directed you to perform step 42 of OP-902-002 after RAS initiates.

Time of RAS:_____

TASK ELEMENT	STANDARD
42.a: Verify the RAS is initiated.	Verifies RAS by either ROM indication at CP-7 or RAS Train A and B Logic Initiated annunciators on Panel K.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
42.b: Verify that **BOTH** LPSI pumps are stopped.	Verifies both LPSI Pumps at CP-8 are off.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
42.c: Verify that ESF PUMPS SUCTION SI SUMP valves are open: • SI 602A • SI 602B	SI-602 A and B at CP-8 are open.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
42.d: Close the SI PUMPS RECIRC ISOL VALVES within two minutes of receipt of RAS: • SI 120A • SI 120B • SI 121A • SI 121B	SI-120 A and B and SI-121 A and B at CP-8 are closed within 2 minutes of RAS actuation.
Comment: Time step completed:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
42.e: Close the ESF PUMPS SUCTION RWSP: • SI 106A • SI 106B	SI-106 A and B at CP-8 are closed.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
42.f: Place **ALL** charging pumps in "OFF."	All Charging Pumps control switches at CP-4 are in OFF.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
42.g: Close CVC 209, CHARGING HEADER ISOLATION.	CVC-209 at CP-4 is closed.
Comment: Key 203 is necessary for this manipulation.	**Critical** **SAT / UNSAT**

END OF TASK

APPLICANT CUE SHEET

(TO BE RETURNED TO EXAMINER TO UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

A loss of coolant accident is in progress.
RAS initiation is imminent.

INITIATING CUES:

- The CRS has directed you to perform step 42 of OP-902-002 after RAS initiates.

SIMULATOR OPERATOR INSTRUCTIONS

Reset to IC-96

There are no malfunctions or overrides necessary for this JPM.

After reset, put simulator in run and Freeze simulator when RWSP level is 11%.

Emergency Operating Procedure
OP-902-002
Loss of Coolant Accident Recovery

OSRC Meeting No.: W3 07-23

Reviewed by: R Dobbs 12/14/07

OSRC Chairman

Approved by: 12/17/07

General Manager - Plant Operations

Approval Date

12/20/2007

Effective Date

Continuous Use

INSTRUCTIONS CONTINGENCY ACTIONS

---------- **NOTE** ----------

SI 120A(B) and SI 121A(B), SI PUMPS RECIRC ISOL, should be closed within two minutes of receipt of RAS to prevent recirculating SI sump water to the RWSP.

RAS Initiation Criteria

* 42. **IF** the break is inside containment, **AND** RWSP level is less than 10%, **THEN**:

a. Verify the RAS is initiated.

b. Verify that **BOTH** LPSI pumps are stopped.

c. Verify that ESF PUMPS SUCTION SI SUMP valves are open:

- SI 602A
- SI 602B

d. Close the SI PUMPS RECIRC ISOL VALVES within two minutes of receipt of RAS:

- SI 120A
- SI 120B
- SI 121A
- SI 121B

(continue)

INSTRUCTIONS

CONTINGENCY ACTIONS

* 42. (continued)

e. Close the ESF PUMPS SUCTION RWSP:

- SI 106A
- SI 106B

f. Place **ALL** charging pumps in "OFF."

g. Close CVC 209, CHARGING HEADER ISOLATION.

SI-602 Override

* 43. **IF** in the opinion of the Emergency Coordinator, closing SI 602A(B) Safety Injection System Sump Isolation valve to stop Emergency Core Cooling System leakage is in the best interest of protecting the public health and safety, **THEN** REFER TO Appendix 29, "SI-602 Override" and isolate SI 602A(B).

Waterford 3

2009 NRC Exam

JOB PERFORMANCE MEASURE

S4

Place Shutdown Cooling Train A in Service

Applicant: _____

Examiner: _____

JOB PERFORMANCE MEASURE
DATA PAGE

Task: Place Shutdown Cooling Train A in Service

Task Standard: Applicant places Shutdown Cooling Train A in service and secures Low Pressure Safety Injection Pump A after SI-405 A fails closed.

References: OP-009-005, Shutdown Cooling
OP-901-131, Shutdown Cooling Malfunction

Validation Time: 30 minutes Time Critical: No

Alternate Path: Yes

Applicant: _____

Time Start: _____ Time Finish: _____

Performance Time: _____ minutes

Performance Rating: SAT UNSAT

Comments: _____

_____

_____

_____

_____

Examiner: _____ Date: _____
Signature

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Tools/Equipment/Procedures Needed:

OP-009-005

Description:
This task is performed at CP-8. The applicant must place Shutdown Cooling Train A in service. The fault in this task is that SI-405 A, RC Loop 2 SDC Suction Inside Containment Isol, will fail closed, requiring the applicant to secure Low Pressure Safety Injection Pump A. The task can be stopped after LPSI Pump A is secured.

READ TO APPLICANT

DIRECTION TO APPLICANT:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Indicate to me when you understand your assigned task.

INITIAL CONDITIONS:

- The plant is in Mode 4
- Protected Train is A
- RCS temperature is 280 °F
- RCS pressure is 340 PSIA
- Shutdown Cooling Train A has been placed in Standby in accordance with OP-009-005, Shutdown Cooling, section 5.3.

INITIATING CUES:

- The CRS has directed you to place Shutdown Cooling Train A in service in accordance with OP-009-005, section 6.1.

TASK ELEMENT	STANDARD
Procedure Note: The Shutdown Cooling Train placed in service should be on the Protected Train.	Note reviewed.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
Procedure Caution: If a design basis tornado event occurs, then Shutdown Cooling (SDC) should not be initiated until 23 hours post-event to ensure CCW Heat Exchanger (CCW HX) outlet CCW temperature remains ≤ 130 °F. When SDC is initiated for this event, then maintain CCW HX outlet temperature ≤130 °F.	Caution reviewed.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.1: Verify Shutdown Cooling Train A has been aligned to Standby condition in accordance with Section 5.3, Alignment of Shutdown Cooling Train A to Standby Condition.	Cue sheet lists this as complete.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.2: Verify sufficient number of Dry Cooling Tower Fans running to accept increased heat load on CCW System.	Any fans started must be started in FAST.
Comment: Applicant may ask the CRS how man fans he wants running. If asked, respond to keep the fans in automatic and verify they cycle on as required. Any number of fans started is acceptable.	**SAT / UNSAT**

TASK ELEMENT	STANDARD
Procedure Caution: (1) A design basis tornado event occurs, then the CCW Heat Exchanger outlet CCW temperature should be maintained ≤130 °F. The temperature of the CCW return line from Shutdown Cooling Heat Exchanger a can be monitored on PMC PID A43806. (2) CC-963A is required to be maintained open while in Mode 4 to preserve the design temperature basis of piping and associated components at the CCW outlet of shutdown cooling heat exchanger A. With CC-963A open, flow through Shutdown Cooling Heat Exchanger A will be maintained above 2305 gpm.	Caution reviewed.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.3: Place Shutdown HX A CCW Flow Control, CC-963A, control switch to Open.	CC-963 A is opened.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
(1) The following Reactor Coolant System limits shall be met for Shutdown Cooling Entry: RCS temperature limit: < 350 °F RCS pressure limit: < 392 psia (2) If Containment Spray Header A Isolation, CS-125 A, is open while Shutdown Cooling Train A is operating, then Containment Spray A riser may fill and possibly spray water into Containment, due to leakage past Containment Spray Pump A discharge stop check, CS-117A.	Caution reviewed.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.4: Unlock and Open RC Loop 2 SDC Suction Outside Containment Isol, SI-407A.	SI-407 A is opened.
Comment: Key 133 required.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.5: Notify Radiation Protection Department that Shutdown Cooling Train A is being placed in service.	Call is made.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.6: Start LPSI Pump A.	LPSI Pump A is started.
Comment: Annunciator LPSI Pump A Flow Lost (Cabinet M, F-3) is expected. It will clear when the applicant raises flow > 2900 gpm.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.7: Raise Shutdown Cooling flow by Manually adjusting LPSI Header Flow controller 2A/2B, SI-IFIC-0307, output until Shutdown Cooling Header A Flow indicates 4100 GPM, as indicated by RC Loop 2 Shdn Line Flow Indicator, SI-IFI-1307-A1.	Flow is raised to 4100 gpm.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.8: Adjust LPSI Header Flow Controller 2A/2B, SI-IFIC-0307, setpoint potentiometer to 73%, and place controller to AUTO.	Setpoint potentiometer is set to 73%, and controller is placed in AUTO
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.9: Verify LPSI Header Flow Controller 2A/2B, SI-IFIC-0307, is maintaining 4100 GPM Shutdown Cooling Header A flow, as indicated by RC Loop 2 Shdn Line Flow Indicator, SI-IFI-1307-A1.	Flow is verified.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
Procedure note: If a sample was drawn prior to shutdown and no interim shutdown has occurred where SDC was placed in service and boron concentration could have been reduced, then sampling is not required.	Note reviewed.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.10: At SM/CRS discretion, direct Chemistry Department to sample Shutdown Cooling Train A for boron concentration.	None
Comment: Evaluator: When requested provide information to applicant that all required Chemistry requirements are met.	**SAT / UNSAT**

TASK ELEMENT	STANDARD
Procedure Note: Shutdown Cooling Train A requires one operable Low Pressure Safety Injection Flow Control Valve for the train to be operable.	Note reviewed.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
Procedure Caution: The Reactor Coolant System shall not exceed the 100 °F per hour cooldown rate of Technical Specification 3.4.8.1.	Caution reviewed.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.11.1: Open the following valves: • SI-139A LPSI Header to RC Loop 2A Flow Control • SI-138A LPSI Header to RC Loop 2B Flow Control	SI-139 A and SI-138 A are open.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.11.2: Throttle Closed RC Loop 2 Shdn Cooling Warmup, SI-135A, until one of the following is within 100°F of Shutdown Cooling Train A temperature, as indicated by LPSI Pump A Discharge Header Temperature Indicator, SI-ITI-0351X: Hot Leg 2 temperature, as indicated by RC Loop 2 Hot Leg Temperature Indicator, RC-ITI-0122-HA	Temperature is within 100 °F
Comment: SI-135 A is a large gate valve with a very long stroke.	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.11.3: Close RC Loop 2 Shdn Cooling Warmup, SI-135 A.	SI-135 A is closed
Comment:	**Critical** **SAT / UNSAT**

Simulator Operator: Initiate Trigger 1.

TASK ELEMENT	STANDARD
Secure LPSI Pump A	LPSI Pump A is off.
Comment:	**Critical** **SAT / UNSAT**

END OF TASK

APPLICANT CUE SHEET

(TO BE RETURNED TO EXAMINER TO UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

- The plant is in Mode 4
- Protected Train is A
- RCS temperature is 280 °F
- RCS pressure is 340 PSIA
- Shutdown Cooling Train A has been placed in Standby in accordance with OP-009-005, Shutdown Cooling, section 5.3.

INITIATING CUES:

- The CRS has directed you to place Shutdown Cooling Train A in service in accordance with OP-009-005, section 6.1.

SIMULATOR OPERATOR INSTRUCTIONS

Reset to IC-95

Verify the following Malfunctions:

- Si23a for SI-405 A

When SI-135 A is fully closed at step 6.1.11.3, initiate Trigger 1 to close SI-405 A.

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CONTINUOUS USE

3.0 PRECAUTIONS AND LIMITATIONS

3.1 PRECAUTIONS

3.1.1 The maximum temperature for Purification Ion Exchanger(s) is 140°F.

3.1.2 If Letdown to Ion Exchangers Inlet/Bypass, CVC-140, is in AUTO then Purification Ion Exchangers will automatically bypass at 140°F.

3.1.3 The following applies to Shutdown Cooling flow:

3.1.3.1 A total minimum Shutdown Cooling flow necessary to remove decay heat and prevent boron stratification should be maintained at all times.

3.1.3.2 When considering the minimum Shutdown Cooling flow required to adequately remove decay heat and prevent boron stratification, then the flow from the operating Shutdown Cooling train or the combined flow of both operating Shutdown Cooling trains may be used.

3.1.3.3 The required minimum Shutdown Cooling flow for Modes 5 and 6 are as follows:

TIME AFTER SHUTDOWN (HOURS)	REQUIRED FLOW (GPM)
0 - <175 hours ①	≥4000 GPM
≥175 - <375 hours	≥3000 GPM
≥375 hours	≥2000 GPM

① If the Reactor has been shutdown <175 hours, then Shutdown Cooling flow may be reduced to ≥3000 GPM, if RCS temperature is verified to be <135°F at least once per hour.

3.1.4 LPSI pumps shall not be run for >3 hours in any 24 hour period on recirculation flow only.

3.1.5 If LPSI Pump flow is limited to >100 gpm and <2000 gpm for 3 consecutive hours, then contact the System Engineer for guidance on LPSI Pump monitoring. **[CR-W3-2000-1376]**

3.2 LIMITATIONS

3.2.1 Shutdown Cooling shall not be initiated until Reactor Coolant System (RCS) temperature <350°F and RCS Pressure <392 PSIA. **[P-4055]**

3.2.2 RCS temperature changes shall be limited by the following:

- A maximum heatup rate of 60°F per hour
- A maximum cooldown rate of 100°F per hour

3.2.3 RCS temperature and pressure shall be limited in accordance with the limit lines shown on Technical Specification Figures 3.4-2 and 3.4-3 with instrument uncertainty incorporated for pressure and temperature as follows: **[ER-W3-2004-00439]**

- Subtract 30°F from indicated temperature
- Add 35 PSI to the indicated pressure from the following instruments:

  CP-2
  - RC IPI0103 (100-750 PSIA)
  - RC IPI0104 (100-750 PSIA)

  CP-4
  - RC IPI0105 (100-750 PSIA)
  - RC IPI0106 (100-750 PSIA)

  CP-7
  - RC IPI0101A(B,C,D) (1500-2500 PSIA)

  LCP-43
  - RC IPI0105-1 (100-750 PSIA)
  - RC IPI0106-1 (100-750 PSIA)
- Add 110 PSI to the indicated pressure from the following instruments:

  CP-2
  - RC IPI0102A3 (B3) (0-3000 PSIA)

  CP-4
  - RC IPI0102A2 (B2) (0-3000 PSIA)

  CP-7
  - RC IPI0102A (B,C,D) (0-3000 PSIA)

  LCP-43
  - RC IPI0102A1 (B1,C1,D1) (0-3000 PSIA)

3.2.4 Maximum flow through a Purification Ion Exchanger is 126 GPM.

3.2.5 When RCS is in Mode 4 and any RCS Cold Leg temperature is <230°F or in Mode 5 or Mode 6 with Reactor Vessel Head on, then Low Temperature Overpressure Protection (Tech. Spec. 3.4.8.3) shall be provided by one of the following: **[P-5804]**

- Both Shutdown Cooling Suction Header Relief Valves aligned to RCS

  or

- RCS depressurized with an RCS vent ≥5.6 in^2

3.2.6 In Mode 4 with RCS pressure >400 PSIA, Both Containment Spray Trains shall be operable in accordance with Tech Spec 3.6.2.1.

3.2.7 The Shutdown Cooling Train placed in service should be on the Protected Train.

3.2.8 Scaffolding will be required to Vent CS Header A, when restoring CS to operation after securing Shutdown Cooling.

3.2.9 Shutdown Cooling requires one Operable Low Pressure Safety Injection Flow Control Valve per train for Shutdown Cooling to be Operable.

3.2.10 The Shutdown Cooling suction line piping upstream of SI-407A(B) should not be filled from an external water source due to the potential to cause thermal binding of SI-405A(B). There is a possibility of air intrusion into and voiding of the Shutdown Cooling suction line piping upstream of SI-407A(B) following a period of operation in Modes 1 – 4, when the Safety Injection and Containment Spray Systems are aligned for the normal injection mode. This condition has been evaluated and is described in the Design Basis Document for the Safety Injection System (W3-DBD-001). The Safety Injection System retains the capability of performing its design safety function with the described voiding and no actions are required to fill the subject section of piping.
[ER-W3-2002-0283-002, CR-WF3-2004-01300, ECM03-003, W3-DBD-01]

3.2.11 Each pump start stresses motor windings both thermally and mechanically. A start means motor comes up to rated speed. Starts for LPSI pumps should be limited as follows:

3.2.11.1 LPSI Pump A:

3.2.11.1.1 With motor at ambient temperature, do not attempt more than 6 consecutive starts.

3.2.11.1.2 With motor at operating temperature, do not attempt more than 4 consecutive starts.

3.2.11.1.3 Allowed time between additional starts is 15 minutes with motor at operating temperature or 30 minutes with motor at ambient temperature.

3.2.11.2 LPSI Pump B:

3.2.11.2.1 With motor at ambient temperature, do not attempt more than 2 consecutive starts.

3.2.11.2.2 With motor at operating temperature, do not attempt more than 1 consecutive starts.

3.2.11.2.3 Allowed time between additional starts is 15 minutes with motor at operating temperature or 45 minutes with motor at ambient temperature.

3.2.12 If a Design Basis Tornado Event occurs, then Shutdown Cooling (SDC) should not be initiated until 23 hours post-event to ensure the CCW Heat Exchanger (CCW HX) Outlet CCW Temperature remains ≤ 130°F. When SDC is initiated for this event, then maintain CCW HX Outlet Temperature ≤ 130°F.

3.2.13 To assure that the RCS does not drop to the minimum RCS bolt up Temperature indicated on TS figures 3.4-2 and 3.4-3, the limits on the following instruments apply:

Instrument	Description	Min Value	Location
SI IT7114 / SI IT7115	RWSP Temperature	67.3°F	PMC
SI IT0351 X / SI IT0352 X	LPSI Pump Outlet Temperature	66.09°F	QSPDS
CS IT0303 X AND Y	Shutdown Cooling Outlet Temperature	66.09°F	QSPDS

6.0 NORMAL OPERATIONS

6.1 PLACING SHUTDOWN COOLING TRAIN A IN SERVICE

NOTE

The Shutdown Cooling Train placed in service should be on the Protected Train.

CAUTION

IF A DESIGN BASIS TORNADO EVENT OCCURS, THEN SHUTDOWN COOLING (SDC) SHOULD NOT BE INITIATED UNTIL 23 HOURS POST-EVENT TO ENSURE CCW HEAT EXCHANGER (CCW HX) OUTLET CCW TEMPERATURE REMAINS ≤130°F. WHEN SDC IS INITIATED FOR THIS EVENT, THEN MAINTAIN CCW HX OUTLET TEMPERATURE ≤130°F.

6.1.1 Verify Shutdown Cooling Train A has been aligned to Standby condition in accordance with Section 5.3, Alignment of Shutdown Cooling Train A to Standby Condition.

6.1.2 Verify sufficient number of Dry Cooling Tower Fans running to accept increased heat load on CCW System.

CAUTION

(1) A DESIGN BASIS TORNADO EVENT OCCURS, THEN THE CCW HEAT EXCHANGER OUTLET CCW TEMPERATURE SHOULD BE MAINTAINED ≤130°F. THE TEMPERATURE OF THE CCW RETURN LINE FROM SHUTDOWN COOLING HEAT EXCHANGER A CAN BE MONITORED ON PMC PID A43806.

(2) CC-963A IS REQUIRED TO BE MAINTAINED OPEN WHILE IN MODE 4 TO PRESERVE THE DESIGN TEMPERATURE BASIS OF PIPING AND ASSOCIATED COMPONENTS AT THE CCW OUTLET OF SHUTDOWN COOLING HEAT EXCHANGER A. WITH CC-963A OPEN, FLOW THROUGH SHUTDOWN COOLING HEAT EXCHANGER A WILL BE MAINTAINED ABOVE 2305 GPM. **[EC-738]**

6.1.3 Place Shutdown HX A CCW Flow Control, CC-963A, control switch to Open.

CAUTION

(1) THE FOLLOWING REACTOR COOLANT SYSTEM LIMITS SHALL BE MET FOR SHUTDOWN COOLING ENTRY:

- RCS TEMPERATURE LIMIT: <350°F
- RCS PRESSURE LIMIT: <392 PSIA

(2) IF CONTAINMENT SPRAY HEADER A ISOLATION, CS-125A, IS OPEN WHILE SHUTDOWN COOLING TRAIN A IS OPERATING, THEN CONTAINMENT SPRAY A RISER MAY FILL AND POSSIBLY SPRAY WATER INTO CONTAINMENT, DUE TO LEAKAGE PAST CONTAINMENT SPRAY PUMP A DISCHARGE STOP CHECK, CS-117A.

6.1.4 Unlock and Open RC Loop 2 SDC Suction Outside Containment Isol, SI-407A.

6.1.5 Notify Radiation Protection Department that Shutdown Cooling Train A is being placed in service.

6.1.6 Start LPSI Pump A.

6.1.7 Raise Shutdown Cooling flow by Manually adjusting LPSI Header Flow controller 2A/2B, SI-IFIC-0307, output until Shutdown Cooling Header A Flow indicates 4100 GPM, as indicated by RC Loop 2 Shdn Line Flow Indicator, SI-IFI-1307-A1.

6.1.8 Adjust LPSI Header Flow Controller 2A/2B, SI-IFIC-0307, setpoint potentiometer to 73%, and place controller to AUTO.

6.1.9 Verify LPSI Header Flow Controller 2A/2B, SI-IFIC-0307, is maintaining 4100 GPM Shutdown Cooling Header A flow, as indicated by RC Loop 2 Shdn Line Flow Indicator, SI-IFI-1307-A1.

NOTE

If a sample was drawn prior to shutdown and no interim shutdown has occurred where SDC was placed in service and boron concentration could have been reduced, then sampling is not required.

6.1.10 At SM/CRS discretion, direct Chemistry Department to sample Shutdown Cooling Train A for boron concentration.

6.1.10.1 When Chemical Analysis results indicate that Shutdown Cooling Train A boron concentration is greater than Reactor Coolant boron concentration or ≥2050 PPM (required for Mode 6), then proceed to next step.

NOTE

Shutdown Cooling Train A requires one operable Low Pressure Safety Injection Flow Control Valve for the train to be operable.

CAUTION

THE REACTOR COOLANT SYSTEM SHALL NOT EXCEED THE 100°F PER HOUR COOLDOWN RATE OF TECHNICAL SPECIFICATION 3.4.8.1.

6.1.11 Raise Shutdown Cooling Train A temperature to within 100°F of Reactor Coolant Hot Leg temperature as follows:

6.1.11.1 Open the following valves:

- SI-139A LPSI Header to RC Loop 2A Flow Control
- SI-138A LPSI Header to RC Loop 2B Flow Control

6.1.11.2 Throttle Closed RC Loop 2 Shdn Cooling Warmup, SI-135A, until one of the following is within 100°F of Shutdown Cooling Train A temperature, as indicated by LPSI Pump A Discharge Header Temperature Indicator, SI-ITI-0351X: **[P-23174]**

- Hot Leg 2 temperature, as indicated by RC Loop 2 Hot Leg Temperature Indicator, RC-ITI-0122-HA

or

- Hot Leg 1 temperature, as indicated by RC Loop 1 Hot Leg Temperature Indicator, RC-ITI-0112-HB

6.1.11.3 Close RC Loop 2 Shdn Cooling Warmup, SI-135A.

CAUTION

THE FOLLOWING APPLIES TO SHUTDOWN COOLING FLOW:

(1) A TOTAL MINIMUM SHUTDOWN COOLING FLOW NECESSARY TO REMOVE DECAY HEAT AND PREVENT BORON STRATIFICATION SHOULD BE MAINTAINED AT ALL TIMES.

(2) WHEN CONSIDERING THE MINIMUM SHUTDOWN COOLING FLOW REQUIRED TO ADEQUATELY REMOVE DECAY HEAT AND PREVENT BORON STRATIFICATION, THE FLOW OF BOTH OPERATING SHUTDOWN COOLING TRAINS MAY BE USED.

(3) THE REQUIRED MINIMUM SHUTDOWN COOLING FLOW FOR MODES 5 AND 6 ARE AS FOLLOWS:

TIME AFTER SHUTDOWN (HOURS)	REQUIRED FLOW (GPM)
<175 HOURS ①	≥4000 GPM
≥175 HOURS	≥3000 GPM
≥375 HOURS	≥2000 GPM

① IF THE REACTOR HAS BEEN SHUTDOWN <175 HOURS, THEN SHUTDOWN COOLING FLOW MAY BE REDUCED TO ≥3000 GPM IF RCS TEMPERATURE IS VERIFIED TO BE <135°F AT LEAST ONCE PER HOUR.

6.1.12 Adjust LPSI Header Flow Controller 2A/2B, SI-IFIC-0307, setpoint potentiometer to obtain desired Shutdown Cooling Train A flow, as indicated by RC Loop 2 Shdn Line Flow Indicator, SI-IFI-1307-A1.

CAUTION

(1) THE REACTOR COOLANT SYSTEM SHALL NOT EXCEED THE 100°F PER HOUR COOLDOWN RATE OF TECHNICAL SPECIFICATION 3.4.8.1.

(2) IF A DESIGN BASIS TORNADO EVENT OCCURS, THEN THE CCW HEAT EXCHANGER OUTLET CCW TEMPERATURE SHOULD BE MAINTAINED ≤130°F. THE TEMPERATURE OF THE CCW RETURN LINE FROM SHUTDOWN COOLING HEAT EXCHANGER A CAN BE MONITORED ON PMC PID A43806.

(3) CC-963A IS REQUIRED TO BE MAINTAINED OPEN WHILE IN MODE 4 TO PRESERVE THE DESIGN TEMPERATURE BASIS OF PIPING AND ASSOCIATED COMPONENTS AT THE CCW OUTLET OF SHUTDOWN COOLING HEAT EXCHANGER A. WITH CC-963A OPEN, FLOW THROUGH SHUTDOWN COOLING HEAT EXCHANGER A WILL BE MAINTAINED ABOVE 2305 GPM. **[EC-738]**

6.1.13 Maintain RCS temperature control as follows:

6.1.13.1 Throttle Open Shutdown Cooling HX A Temperature Control, SI-415A, as required.

6.1.13.2 Place Shutdown HX A CCW Flow Control, CC-963A, to Open or Setpoint, as required.

NOTE

Once activated the SHUTDOWN COOLING TROUBLE annunciator (Window H-18 on cabinet N) will alarm since the Low Flow setpoints are initially failed High.

6.1.14 Verify Computer Point PID B43800, SDCS Alarm Processing, set to ACTIVE state in accordance with OP-004-012, Plant Computer System.

6.1.15 Verify Computer Point PID K43101, SDCS/LPSI PMP A LOW FLOW LIM, set to approximately 200 gpm below the established Shutdown Cooling Train A flow, as indicated by RC Loop 2 Shdn Line Flow Indicator, SI-IFI-1307-A1.

6.1.16 If Shutdown Cooling Train B is not in service, then set Computer Point PID K43201 SDCS/LPSI PMP B LOW FLOW LIM, to Zero in accordance with OP-004-012, Plant Computer System.

6.1.17 If CETs from QSPDS Channel 1(2) are not available, then set PID C26417(C26510), TRCET Representative CET, to zero.

6.1.18 Verify SHUTDOWN COOLING TROUBLE annunciator (WINDOW H-18 ON CABINET N) is Clear.

NOTE

Due to thermal expansion, the Shutdown Cooling Heat Exchanger A Outlet Stop Check, CS-117A, must be re-tightened in the Closed direction approximately 3 hours after Shutdown Cooling Train A is placed in service.

6.1.19 Verify Closed, Shutdown Cooling Heat Exchanger A Stop Check, CS-117A, approximately 3 hours after Shutdown Cooling Train A is placed in service.

6.1.20 If splitting of CCW Trains is necessary as directed by the SM/CRS, then go to Section 6.13, Splitting Out CCW Trains When on Shutdown Cooling.

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CONTINUOUS USE

D. IMMEDIATE OPERATOR ACTIONS

1. IF ANY of the following Shutdown Cooling Loop Suction Isolation valves close on the operating Shutdown Cooling train, THEN secure LPSI Pump:
   - For LPSI Pump A:
     - SDCS LOOP 2 SUCTION ISOL UPSTREAM INSIDE (SI 401A)
     - SDCS LOOP 2 SUCTION ISOL DOWNSTREAM INSIDE (SI 405A)
     - SDCS LOOP 2 SUCTION ISOL DOWNSTREAM OUTSIDE (SI 407A)
   - For LPSI Pump B:
     - SDCS LOOP 1 SUCTION ISOL UPSTREAM INSIDE (SI 401B)
     - SDCS LOOP 1 SUCTION ISOL DOWNSTREAM INSIDE (SI 405B)
     - SDCS LOOP 1 SUCTION ISOL DOWNSTREAM OUTSIDE (SI 407B).

Waterford 3

2009 NRC Exam

JOB PERFORMANCE MEASURE

S5

Perform OP-903-037, Containment Cooling Fans Operability Check

Applicant: _____

Examiner: _____

JOB PERFORMANCE MEASURE
DATA PAGE

Task: Perform OP-903-037, Containment Cooling Fans Operability Check

Task Standard: Applicant completes OP-903-037 with CCS Fans A, B, and C running.

References: OP-903-037, Containment Cooling Fans Operability Check
OP-008-003, Containment Cooling System

Validation Time: 15 minutes Time Critical: No

Alternate Path: No

Applicant: _____

Time Start: _____ Time Finish: _____

Performance Time: _____ minutes

Performance Rating: SAT UNSAT

Comments: _____

_____

_____

_____

_____

Examiner: _____ Date: _____
Signature

EXAMINER COPY ONLY

Tools/Equipment/Procedures Needed:

OP-903-037, Containment Cooling Fans Operability Check
OP-008-003, Containment Cooling System

Description:
This task is performed at CP-18. The applicant must perform surveillance OP-903-037, which will require logging differential pressure for the 3 running fans. The applicant will then have to secure a running Containment Cooling Fan and start Containment Cooling Fan D, at which time the data for CCS Fan D can be recorded.
The applicant should then leave the CCS Fans in an alignment with A, B, and D running, as specified in OP-903-037.

READ TO APPLICANT

DIRECTION TO APPLICANT:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Indicate to me when you understand your assigned task.

INITIAL CONDITIONS:

- Plant is in Mode 1

INITIATING CUES:

- The CRS has directed you to perform OP-903-037, Containment Cooling Fans Operability Check

TASK ELEMENT	STANDARD
7.1: Record differential pressure (DP) and CCW flow rate for operating CFC units on Attachment 10.1, CFC Data Sheet.	Correct values are recorded.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Procedure Note: Attachment 10.2, Run Time Equalization Schedule Sheet, should be referenced in determining which CFC operating unit(s) is secured.	Attachment referenced for month of October.
Comment: If asked, inform the applicant to align for the month of October.	**SAT / UNSAT**

TASK ELEMENT	STANDARD
Procedure Caution: To prevent vibration alarms, and damage to Containment Cooling unit duct work, limit configuration to only three (3) of four (4) units operating at a time.	Caution referenced.
Comment: Step 7.2 directs operating the idle Containment Fan Cooler. Procedure OP-008-003, Containment Cooling, will be used at this time.	**SAT / UNSAT**

TASK ELEMENT	STANDARD
OP-008-003, 7.1.1: Stop Containment Fan Cooler C, from CP-18, by placing Fan Cooler C control switch to Stop.	CCS Fan C is off.
Comment: Evaluator: This is written for the applicant to secure CCS Fan C, which is the most reasonable fan for him to stop. It is acceptable for the applicant to secure CCS Fan A or B at this point. This would require the applicant to maneuver fans later in the task to leave fans A, B, and D running.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
7.1.2: Verify at CP-18, that CC-807 A and CC-823 A, Component Cooling Water Inlet and Outlet Valves for Containment Fan Cooler C are Closed.	Verification is complete.
Comment: Evaluator: Statement for step above also applies to this step.	**SAT / UNSAT**

TASK ELEMENT	STANDARD
Procedure Note: Normal Containment Cooling System Configuration in modes 1-4 is three (3) Containment Fan Coolers operating and one (1) in standby.	Note Reviewed.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
Procedure Caution: To prevent vibration alarms and damage to Containment Cooling unit duct work, limit configuration to only three (3) of four (4) Containment Fan Coolers operating at one time when in fast speed.	Caution referenced.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.1: Start Containment Fan Cooler D from CP-18, by placing Fan Cooler D control switch to Start/ Fast.	CCS Fan D is running.
Comment:	**<u>Critical</u>** **SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.2: Verify at CP-18 that CC-808 B and CC-822 B, Component Cooling Water Inlet and Outlet Valves for CCS Fan D, are Open	Verification complete.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
OP-903-037, 7.3: Record CFC D start time and CCW flow rate on Attachment 10.1, CFC Data Sheet.	Time and flow is recorded.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
7.4: When CFC D has operated for > 15 minutes, then record differential pressure on Attachment 10.1, CFC Data Sheet.	Differential pressure is recorded.
Comment: Evaluator: Prompt applicant that 15 minutes has passed at step 7.4.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
7.5: Verify all four CFC units were operated and data recorded on Attachment 10.1, CFC Data Sheet.	Attachment updated.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
7.6: Verify each CFC Unit CCW flow rate is > 625 GPM.	Attachment updated with initials.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
7.7: Refer to Attachment 10.2, Run Time Equalization Schedule Sheet, to obtain CFC unit alignment for the upcoming month.	Applicant determines the correct alignment is CCS Fans A, B, and D running.
Comment: If asked, inform the applicant to align for the month of October.	**SAT / UNSAT**

TASK ELEMENT	STANDARD
7.8: Verify that CFC units are aligned as required on Attachment 10.1, CFC Data Sheet.	Attachment updated.
Comment:	**SAT / UNSAT**

END OF TASK

APPLICANT CUE SHEET

(TO BE RETURNED TO EXAMINER TO UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

- Plant is in Mode 1

INITIATING CUES:

- The CRS has directed you to perform OP-903-037, Containment Cooling Fans Operability Check

SIMULATOR OPERATOR INSTRUCTIONS

Reset to IC-97

There are no malfunctions or overrides for this JPM.

REQUEST/APPROVAL PAGE

SAFETY RELATED

Required Review Level (check one)

☐ PORC

☑ QUALIFIED REVIEWER

PROCEDURE NUMBER: OP-903-037 REVISION: 5 CHANGE: 0 DEVIATION: N/A

TITLE: Containment Cooling Fan Operability Verification

EFFECTIVE DATE/MILESTONE: N/A
(N/A If Same as Approval Date)

PROCEDURE OWNER: Assistant Operations Manager (Support)
(Position Title)

PREPARER (Print Name / Initial): Bruce N. Proctor / BNP DATE: 01/02/2003

ACTION:

☐ New Procedure

☐ Deletion

☑ Revision

☐ Change EC? ☐ N/A
(Applicable W2.109 Step Numbers)

☐ Deviation Expiration Date/Milestone: N/A

☐ Temporary Procedure Applicable Conditions: N/A

DESCRIPTION AND JUSTIFICATION OF CHANGE:

1. Reformatted entire procedure to current standards including conversion from letter gothic to arial font.
2. Changed all references of Shift Supervisor, Shift Superintendent, SS/CRS to Shift Manager, SM/CRS.
3. Added existing commitments to the reference section..

☐ Request/Approval Page Continuation Sheet(s) attached

EC SUPERVISOR		APPROVAL:	N/A	DATE:	N/A
50.59 REVIEWER	Required?☑	REVIEW:	[signature]	DATE:	2/24/03
☐ PROGRAMATICALLY EXCLUDED		PORC Mtg. No.:	N/A	DATE:	N/A
50.54 REVIEWER	Required?☐	REVIEW:	N/A	DATE:	N/A
TECHNICAL REVIEWER		REVIEW:	[signature]	DATE:	~~2/24/03~~ 2/24/03
Change Notice (CN)? ☐					
CHANGE NOTICE (CN) SUPERVISOR		APPROVAL:	N/A	DATE:	N/A
CHANGE NOTICE (CN) ON-SHIFT SS/CRS		APPROVAL:	N/A	DATE:	N/A
			2 Week Final Approval	DATE:	N/A
QUALIFIED REVIEWER	Required?☑	REVIEW:	[signature]	DATE:	2-26-03
GROUP/DEPT. HEAD	REVIEW ☐ or APPROVAL ☑		[signature]	DATE:	4-14-2003
GM, PLANT OPERATIONS	REVIEW ☐ or APPROVAL ☐		N/A	DATE:	N/A
VICE PRESIDENT, OPERATIONS		APPROVAL:	N/A	DATE:	N/A

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CONTINUOUS USE

1.0 PURPOSE

1.1 Provide instructions for verifying operability of each group of Containment Fan Coolers (CFC).

1.2 Perform the following Technical Specifications Surveillance Requirements:
[Commitment P-1487]

- 4.6.2.2.a.1 15 minute operation of each group
- 4.6.2.2.a.2 $\geq$ 625 gpm of CCW flow rate to each cooler

1.3 Running time equalization of Containment Fan Cooling unit motors ensures Containment Fan Coolers are maintained in an environmentally qualified state.

2.0 PREREQUISITES

NONE

3.0 PRECAUTIONS AND LIMITATIONS

3.1 PRECAUTIONS

NONE

3.2 LIMITATIONS

3.2.1 Inform the SM/CRS if the conditions of Section 6.0, Acceptance Criteria, cannot be met.

4.0 INITIAL CONDITIONS

4.1 Obtain SM/CRS permission to perform this test and document on Attachment 10.1, CFC Data Sheet.

4.2 Containment Cooling System in service in accordance with OP-008-003, Containment Cooling System Operating Procedure.

5.0 MATERIAL AND TEST EQUIPMENT

NONE

6.0 ACCEPTANCE CRITERIA

6.1 Each component tested on Attachment 10.1, CFC Data Sheet, shall meet the following criteria.

6.1.1 Each CFC unit not already in operation is started from Control Room and operates for ≥ 15 minutes.

6.1.2 Each CFC unit CCW flow rate is ≥ 625 GPM.

7.0 PROCEDURE

7.1 Record differential pressure (DP) and CCW flow rate for operating CFC units on Attachment 10.1, CFC Data Sheet.

NOTE

Attachment 10.2, Run Time Equalization Schedule Sheet, should be referenced in determining which CFC operating unit(s) is secured .

CAUTION

TO PREVENT VIBRATION ALARMS, AND DAMAGE TO CONTAINMENT COOLING UNIT DUCT WORK, LIMIT CONFIGURATION TO ONLY THREE (3) OF FOUR (4) UNITS OPERATING AT A TIME.

7.2 Adjust CFC operating unit configuration to operate idle CFC unit(s).

7.3 Record CFC unit(s) start time and CCW flow rate, for unit(s) started in Step 7.2 on Attachment 10.1, CFC Data Sheet.

7.4 When CFC unit(s) have operated for ≥ 15 minutes, then record CFC unit(s) differential pressure for unit(s) started in Step 2, on Attachment 10.1, CFC Data Sheet.

7.5 Verify all four CFC units were operated and data recorded on Attachment 10.1, CFC Data Sheet.

7.6 Verify each CFC Unit CCW flow rate is ≥ 625 GPM.

7.7 Refer to Attachment 10.2, Run Time Equalization Schedule Sheet, to obtain CFC unit alignment for the upcoming month.

7.8 Verify that CFC units are aligned as required on Attachment 10.1, CFC Data Sheet.

8.0 AUTOMATIC FUNCTIONS

NONE

9.0 REFERENCES

9.1 USE

9.1.1. OP-008-003, Containment Cooling System Operating Procedure.

9.2 SOURCE

9.2.1. Technical Specification 4.6.2.2.a, Items 1 and 2

9.2.2. LOU-1564-G-853, Sheet 2

9.2.3. Letter W3B90-0308, Run Time Equalization of Containment Cooling System Fan Motors

9.2.4 Commitments

- P-1487 Containment Cooling System - Fan Operability/Cooling Water Flow Verification
- P-4806 Containment System Equipment Tests

10.0 ATTACHMENTS

10.1 CFC Data Sheet

10.2 Run Time Equalization Schedule

10.1 CFC DATA SHEET

Test Permission: _____/_____
SM/CRS (Signature) Date/Time

CFC 'A'	CCS-IDPR-5154AS	_____	INWC
	CC-IFI-7570A2S	_____	GPM
	Circle one:	OPERATING	STARTED
	Start time:	_____	(if required)
CFC 'B'	CCS-IDPR-5154BS	_____	INWC
	CC-IFI-7570B2S	_____	GPM
	Circle one:	OPERATING	STARTED
	Start time:	_____	(if required)
CFC 'C'	CCS-IDPR-5154AS	_____	INWC
	CC-IFI-7570A1S	_____	GPM
	Circle one:	OPERATING	STARTED
	Start time:	_____	(if required)
CFC 'D'	CCS-IDPR-5154BS	_____	INWC
	CC-IFI-7570B1S	_____	GPM
	Circle one:	OPERATING	STARTED
	Start time:	_____	(if required)

		initials
10.1.1	Verify each CFC Unit CCW flow rate is ≥625 GPM and all CFC units started have been operated at least 15 minutes before recording unit DP.	_____
10.1.2	Verify CFC units aligned, if possible, per Attachment 10.2, Run Time Equalization Schedule Sheet.	_____

REMARKS:_____

_____

Performed By: _____ _____/_____
Operator (Signature) (Date/Time)

Reviewed By: _____ _____/_____
SM/CRS (Signature) (Date/Time)

10.2 RUN TIME EQUALIZATION SCHEDULE SHEET

NOTE

CFC units should be aligned in accordance with monthly schedule to equalize run times. If conditions do not allow running CFCs in accordance with this schedule or the System Engineer requests a different alignment, note change in remarks section of Attachment 10.1, CFC Data Sheet.

Month	CFC Alignment
January	A, B, C
February	A, B, D
March	B, C, D
April	A, C, D
May	A, B, C
June	A, B, D
July	B, C, D
August	A, C, D
September	A, B, C
October	A, B, D
November	B, C, D
December	A, C, D

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REFERENCE USE

3.0 PRECAUTIONS AND LIMITATIONS

3.1 PRECAUTIONS

3.1.1 Ensure Reactor Cavity Cooling System is not required before securing the Containment Cooling System.

3.1.2 To prevent vibration alarms and damage to Containment Cooling unit duct work, limit configuration to only three (3) of four (4) Containment Fan Coolers operating at one time when in fast speed.

3.1.3 If slow speed jumpers are installed for Containment cooling with Temporary Chilled Water, then ensure that Containment Fan Coolers A and B or C and D are operated at the same speed due to their common discharge duct.

3.1.4 Air flow is reduced to the D-rings when Safety Damper CCS-102A or CCS-102B is open or when fewer than three Containment Fan Coolers are operating. This will cause temperatures on the RCPs to rise and in-leakage to the Reactor Drain Tank to rise. This effect is most prominent when outdoor ambient temperature exceeds 65°F. 2

3.2 LIMITATIONS

3.2.1 Independent verification of Attachment 11.1, Containment Cooling System Standby Breaker Lineup, and Attachment 11.2, Containment Cooling System Instrumentation In-Service Checks, is required.

6.0 NORMAL OPERATIONS

6.1 STARTING CONTAINMENT FAN COOLERS

NOTE

Normal Containment Cooling System Configuration in modes 1-4 is three (3) Containment Fan Coolers operating and one (1) in standby.

CAUTION

TO PREVENT VIBRATION ALARMS AND DAMAGE TO CONTAINMENT COOLING UNIT DUCT WORK, LIMIT CONFIGURATION TO ONLY THREE (3) OF FOUR (4) CONTAINMENT FAN COOLERS OPERATING AT ONE TIME WHEN IN FAST SPEED.

6.1.1. Start desired Containment Fan Coolers (CFC), from CP-18, by placing Fan Cooler A (B, C, D) control switch to Start/ Fast.

6.1.2. Verify at CP-18 that the Component Cooling Water Inlet and Outlet Valves Open for the in-service coolers:

CFC	VALVES	
A	Inlet	CC-808A
	Outlet	CC-822A
B	Inlet	CC-807B
	Outlet	CC-823B
C	Inlet	CC-807A
	Outlet	CC-823A
D	Inlet	CC-808B
	Outlet	CC-822B

NOTE

If Containment Fan Coolers are being started with slow speed jumpers installed for Containment cooling with Temporary Chilled Water, then steps 6.1.3 and 6.1.4 are not applicable.

6.1.3. Check in-service Containment Fan Coolers A (B, C, D) differential pressures within expected range of 5.0 INWC to 8.0 INWC, as indicated on CCS-IDPR-5154A(B).

6.1.4. Check Component Cooling Water flow is $\geq$625 gpm as indicated on CC-IFI-7570A(B).

7.0 SYSTEM SHUTDOWN

7.1 SECURING CONTAINMENT FAN COOLERS

7.1.1. Stop desired Containment Fan Coolers (CFC), from CP-18, by placing Fan Cooler A (B, C, D) control switch to Stop.

7.1.2. Verify at CP-18, that Component Cooling Water Inlet and Outlet Valves for all secured Containment Fan Coolers are Closed.

CFC	VALVES	
A	Inlet	CC-808A
	Outlet	CC-822A
B	Inlet	CC-807B
	Outlet	CC-823B
C	Inlet	CC-807A
	Outlet	CC-823A
D	Inlet	CC-808B
	Outlet	CC-822B

10.1 CFC DATA SHEET

Test Permission: CR Supervisor / 0700 10/9/2009
SM/CRS (Signature) Date/Time

CFC 'A'	CCS-IDPR-5154AS	_____	INWC
	CC-IFI-7570A2S	_____	GPM
	Circle one:	OPERATING	STARTED
	Start time:	_____	(if required)
CFC 'B'	CCS-IDPR-5154BS	_____	INWC
	CC-IFI-7570B2S	_____	GPM
	Circle one:	OPERATING	STARTED
	Start time:	_____	(if required)
CFC 'C'	CCS-IDPR-5154AS	_____	INWC
	CC-IFI-7570A1S	_____	GPM
	Circle one:	OPERATING	STARTED
	Start time:	_____	(if required)
CFC 'D'	CCS-IDPR-5154BS	_____	INWC
	CC-IFI-7570B1S	_____	GPM
	Circle one:	OPERATING	STARTED
	Start time:	_____	(if required)

		initials
10.1.1	Verify each CFC Unit CCW flow rate is ≥625 GPM and all CFC units started have been operated at least 15 minutes before recording unit DP.	_____
10.1.2	Verify CFC units aligned, if possible, per Attachment 10.2, Run Time Equalization Schedule Sheet.	_____

REMARKS: _____

_____

Performed By: _____ _____/_____
Operator (Signature) (Date/Time)

Reviewed By: _____ _____/_____
SM/CRS (Signature) (Date/Time)

Waterford 3

2009 NRC Exam

JOB PERFORMANCE MEASURE

S6

Energize 4.16 KV Safety Bus from Offsite Power

Applicant: _____

Examiner: _____

JOB PERFORMANCE MEASURE
DATA PAGE

Task: Energize 4.16 KV Safety Bus from Offsite Power

Task Standard: Applicant synchronizes EDG B with in-coming power and secures EDG B.

References: OP-902-009, Standard Appendices
Attachment 12-C: Transfer 4.16 KV Safety Bus from EDG to Offsite Power

Validation Time: 15 minutes Time Critical: No

Alternate Path: No

Applicant: _____

Time Start: _____ Time Finish: _____

Performance Time: _____ minutes

Performance Rating: SAT UNSAT

Comments: _____

_____

_____

_____

_____

Examiner: _____ Date: _____
Signature

EXAMINER COPY ONLY

Tools/Equipment/Procedures Needed:

OP-902-009, Standard Appendices, Attachment 12-C: Transfer 4.16 KV Safety Bus from EDG to Offsite Power

Description:
This task is performed at CP-1. The applicant must synchronize Emergency Diesel Generator B across the 3B to 2B Tie Breaker and secure EDG B.

READ TO APPLICANT

DIRECTION TO APPLICANT:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Indicate to me when you understand your assigned task.

INITIAL CONDITIONS:

- A loss of off site power has occurred
- Emergency Diesel Generator B is running in Emergency Mode
- 2B Bus has been restored

INITIATING CUES:

- The CRS directs you to energize the 3B Safety Bus from Offsite Power using OP-902-009, Attachment 12-C.

TASK ELEMENT	STANDARD
1.2.a: Verify BUS B3S TO B2 TIE BKR open.	Verification complete.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
1.2.b: Close BUS B2 TO B3S TIE Breaker.	Breaker is closed.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
1.2.c: Place the SYCHRONIZER key switch in BUS TIE.	Key switch is in BUS TIE.
Comment: Key 209	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
1.2.d.1: Adjust EDG voltage to equal system voltage.	Voltages approximately matched.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
1.2.d.2: Adjust engine speed until synchroscope rotates slowly clockwise.	Synchroscope is rotating slowly in the clockwise direction.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
1.2.d.3: Close BUS B3S TO B2 TIE Breaker at 5 minutes to twelve position on the synchroscope.	Breaker is closed.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
1.2.d.4: Place SYNCHRONIZER key switch in OFF.	Key switch is in OFF.
Comment:	**SAT / UNSAT**

Evaluator Note
Step 1.2.e describes steps for unloading the EDG if SIAS is reset, which for this IC, it is. The steps necessary to unload EDG B follow. If SIAS was not reset, the EDG B Output breaker would have opened when the 3B to 2B Bus Tie Breaker was closed. Since the EDG B Output breaker will not automatically open, the applicant may or may not take action to make this verification at CP-2 or CP-7.

TASK ELEMENT	STANDARD
1.2.e.1: Reduce load on EDG A to 0.1 MW and 0.1 MVARS.	Load is reduced.
Comment: EDG B could reverse power trip at this step if power is reduced too far, or if voltage was raised too high at step 1.2.d.1.	**SAT / UNSAT**

TASK ELEMENT	STANDARD
1.2.e.2: Open EDG B Output Breaker.	Breaker is open.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
1.2.e.3: Stop EDG B.	EDG B is off.
Comment: Evaluator: After taking the EDG B control switch to OFF, both the red and green lights will go off on the control switch. The EDG is in cooldown mode at this point. This continues for 5 minutes. After cooldown is complete, the green light comes on. This task can be terminated when the EDG B control switch is taken to OFF, or after the cooldown cycle is complete, at the examiner's discretion.	**Critical** **SAT / UNSAT**

END OF TASK

APPLICANT CUE SHEET

(TO BE RETURNED TO EXAMINER TO UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

- A loss of off site power has occurred
- Emergency Diesel Generator B is running in Emergency Mode
- 2B Bus has been restored

INITIATING CUES:

- The CRS directs you to energize the 3B Safety Bus from Offsite Power using OP-902-009, Attachment 12-C.

SIMULATOR OPERATOR INSTRUCTIONS

Reset to IC-95

There are no malfunctions or overrides for this JPM.

Emergency Operating Procedure
OP-902-009
Standard Appendices

OSRC Meeting No.: W3 07-23

Reviewed by: R Dodds 12/14/07

OSRC Chairman

Approved by: 12/17/07

General Manager - Plant Operations

Approval Date

12/20/2007

Effective Date

Continuous Use

Electrical Restoration

Attachment 12-C: Transfer 4.16 KV Safety Bus from EDG to Offsite Power

INSTRUCTIONS	CONTINGENCY ACTIONS
____ 1.1 **IF** 4.16 KV nonsafety bus A2 is energized **AND** the 4.16 KV safety bus A3 is energized from the associated EDG, **THEN** perform the following: a. Verify BUS A3S TO A2 TIE BKR open. b. Close BUS A2 TO A3S TIE BKR. c. Place the SYCHRONIZER keyswitch in "BUS TIE." d. Parallel EDG A as follows: 1) Adjust EDG voltage to equal system voltage. 2) Adjust engine speed until synchroscope rotates slowly clockwise. 3) Close BUS A3S TO A2 TIE BKR at 5 minutes to twelve position on the synchroscope. 4) Place SYNCHRONIZER keyswitch in "OFF." (continue)	

INSTRUCTIONS

CONTINGENCY ACTIONS

____ 1.1 (continued)

e. **IF** SIAS is reset, **THEN** unload EDG A as follows:

1) Reduce load on EDG A to 0.1 MW and 0.1 MVARS.

2) Open GEN BREAKER.

3) Stop EDG A.

____ 1.2 **IF** 4.16 KV nonsafety bus B2 is energized **AND** the 4.16 KV safety bus B3 is energized from the associated EDG, **THEN** perform the following:

a. Verify BUS B3S TO B2 TIE BKR open.

b. Close BUS B2 TO B3S TIE BKR.

c. Place the SYCHRONIZER keyswitch in "BUS TIE."

(continue)

INSTRUCTIONS | CONTINGENCY ACTIONS

____ 1.2 (continued)

d. Parallel EDG B as follows:

1) Adjust EDG voltage to equal system voltage.

2) Adjust engine speed until synchroscope rotates slowly clockwise.

3) Close BUS B3S TO B2 TIE BKR at 5 minutes to twelve position on the sychroscope.

4) Place SYNCHRONIZER keyswitch in "OFF."

e. **IF** SIAS is reset, **THEN** unload EDG B as follows:

1) Reduce load on EDG B to 0.1 MW and 0.1 MVARS.

2) Open GEN BREAKER.

3) Stop EDG B.

End of Attachment 12-C

Waterford 3

2009 NRC Exam

JOB PERFORMANCE MEASURE

S7

Place Reactor Power Cutback in Service

Applicant: _____

Examiner: _____

JOB PERFORMANCE MEASURE
DATA PAGE

Task: Place Reactor Power Cutback in Service

Task Standard: A Reactor Power Cutback will be generated when the applicant places RXC in service. The applicant will be required to take the immediate operator actions for Reactor Power Cutback.

References: OP-004-015, Reactor Power Cutback System
OP-901-101, Reactor Power Cutback off normal procedure

Validation Time: 20 minutes Time Critical: No

Alternate Path: Yes

Applicant: _____

Time Start: _____ Time Finish: _____

Performance Time: _____ minutes

Performance Rating: SAT UNSAT

Comments: _____

_____

_____

_____

_____

Examiner: _____ Date: _____
Signature

EXAMINER COPY ONLY

Tools/Equipment/Procedures Needed:

OP-004-015, Reactor Power Cutback System

Description:
This task is performed at CP-2. The applicant must perform OP-004-015 section 6.1 and place Reactor Power Cutback in service. At step 6.1.10, when RXC is placed in service, a RXC signal will be generated. The applicant will be required to take the immediate operator action for RXC, and place the CEA Mode Select switch in Auto-Sequential (AS). The examiner can stop the task after the applicant completes this action.

READ TO APPLICANT

DIRECTION TO APPLICANT:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Indicate to me when you understand your assigned task.

INITIAL CONDITIONS:

- The plant is at 100% power.
- Reactor trip on Turbine trip is in service.
- OP-004-015, section 5.1, Reactor Power Cutback System Standby Alignment, has been completed.
- Attachment 11.1, Manual CEA Subgroup Selection has been completed and reviewed.
- Subgroups 5 and 11 are both required for current plant conditions.

INITIATING CUES:

- The CRS directs you to place Reactor Power Cutback in service.

TASK ELEMENT	STANDARD
6.1.1: Verify Section 5.1, Reactor Power Cutback System Standby Alignment, completed.	Included in cue sheet.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.1.1: Depress LAMP TEST pushbutton and verify all pushbuttons on panel illuminate.	Lamps tested.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.1.1.2 Release LAMP TEST pushbutton.	Button released.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.2: Verify AUTO ACTUATE OUT OF SERVICE pushbutton Illuminated.	Verification complete.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.3: If the TEST RESET pushbutton is illuminated, then depress the TEST RESET pushbutton and verify pushbutton extinguishes.	Verification complete.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.4: Verify Reactor Pwr Cutback Single Chnl Trouble (L-5, Cabinet H) annunciator Clear.	Verification complete.
Comment: Alarm will be clear.	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.5: Verify MANUAL SELECT Illuminated on AUTO SELECT /MANUAL SELECT pushbutton.	Verification complete.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.6: Determine the appropriate CEA subgroup selection by performing Attachment 11.1, Manual CEA Subgroup Selection.	This Attachment has already been completed.
Comment: Evaluator: If asked, inform the applicant that Attachment 11.1 concluded that subgroups 5 and 11 were necessary for both RXC events.	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.7.1: Depress ENTER MANUAL SUBGRPS SELECT pushbutton and verify pushbutton Illuminates.	Manipulation completed.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.7.2: Establish CEA subgroup pattern by Depressing desired SUBGROUP SELECT pushbuttons and verifying each selected pushbutton Illuminates.	Subgroup 5 and 11 pressed.
Comment: On Reactor Power Cutback, Regulating Group 5 and 6 drop. This corresponds to sub-groups 5 and 11. 5 and 11 should be pressed, not 5 and 6.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.7.3: Depress LARGE LOAD REJECT pushbutton and verify pushbutton Illuminates.	Manipulation completed.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.7.4.1: When the SUBGROUP SELECT and LARGE LOAD REJECT pushbuttons have Extinguished (after approximately 60 seconds), then depress DISPLAY SUBGRP SELECT pushbutton and verify pushbutton Illuminates.	Manipulation completed.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.7.4.2: Depress LARGE LOAD REJECT pushbutton and verify pushbutton Illuminates.	Manipulation completed.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.7.4.3: Verify correct CEA subgroup pattern is displayed.	Verification complete.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.8.1: Depress ENTER MANUAL SUBGRPS SELECT pushbutton and verify pushbutton Illuminates.	Manipulation completed.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.8.2: Establish CEA subgroup pattern by Depressing desired SUBGROUP SELECT pushbuttons and verifying each selected pushbutton Illuminates.	Subgroup 5 and 11 pressed.
Comment: On Reactor Power Cutback, Regulating Group 5 and 6 drop. This corresponds to sub-groups 5 and 11. 5 and 11 should be pressed, not 5 and 6.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.8.3: Depress LOSS OF FEED PUMP pushbutton and verify pushbutton Illuminates.	Manipulation completed.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.8.4.1: When the SUBGROUP SELECT and LOSS OF FEED PUMP pushbuttons have Extinguished (after approximately 60 seconds), then depress DISPLAY SUBGRP SELECT pushbutton and verify pushbutton Illuminates.	Manipulation completed.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.8.4.2: Depress LOSS OF FEED PUMP pushbutton and verify pushbutton Illuminates.	Manipulation completed.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.8.4.3: Verify correct CEA subgroup pattern is displayed.	Verification complete.
Comment: Lights extinguish after ~ 60 seconds.	**SAT / UNSAT**

TASK ELEMENT	STANDARD
Procedure Note: Turbine DEH System Program has a minimum floor of 20% power. A Reactor Cutback rod configuration should not be selected that would drop Reactor Power below 20% in the event of a Reactor Power Cutback.	Note reviewed.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.9: Verify both Main Feedwater Pumps operating.	Verification complete.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.1.10: Depress AUTO ACTUATE OUT OF SERVICE pushbutton and verify pushbutton Extinguishes.	Manipulation complete.
Comment: Evaluator: The malfunction is tied to the manipulation of this button. After this button is pressed, the RXC signal will be generated.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
OP-901-101 step D.1: Place Control Element Drive Mechanism Mode Select switch to AS.	Manipulation completed.
Comment: Evaluator: This is an immediate action step for OP-901-101, Reactor Power Cutback.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
OP-901-101 step D.2: Verify selected subgroups dropped.	Verification complete.
Comment: Evaluator: This is an immediate action step for a Reactor Power Cutback. Task should be terminated after this step is completed.	**Critical** **SAT / UNSAT**

END OF TASK

APPLICANT CUE SHEET

(TO BE RETURNED TO EXAMINER TO UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

- The plant is at 100% power.
- Reactor trip on Turbine trip is in service.
- OP-004-015, section 5.1, Reactor Power Cutback System Standby Alignment, has been completed.
- Attachment 11.1, Manual CEA Subgroup Selection has been completed and reviewed.
- Subgroups 5 and 11 are both required for current plant conditions.

INITIATING CUES:

- The CRS directs you to place Reactor Power Cutback in service.

SIMULATOR OPERATOR INSTRUCTIONS

Reset to IC-99

Verify the following under the Event Trigger prompt:

- zdipwautoact.EQ.1 is listed for trigger 1, with the action imf pw04(1).

Keys required to setup this scenario:

- Keys 179 and 180 for CP-2
- Keys 173 – 176 for CP-7

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CONTINUOUS USE

3.0 PRECAUTIONS AND LIMITATIONS

3.1 PRECAUTIONS

3.1.1 Prior to placing the Reactor Power Cutback System (RXC) in service, verify that both Main Feedwater Pumps are operating.

3.1.2 With both CEACs Inoperable, Reactor Power Cutback shall be removed from service within one hour. **[TS 3.3.1]**

3.2 LIMITATIONS

3.2.1 A selected CEA subgroup will not drop during a RXC actuation if that subgroup is on the CEDMCS hold bus. When a Reactor Power Cutback selected subgroup is placed on the CEDMCS hold bus, then remove Reactor Power Cutback System from service in accordance with Section 7.1, Removing Reactor Power Cutback System from Service.

3.2.2 The auto CEA subgroup select function is not available for the Reactor Power Cutback System.

3.2.3 Turbine DEH System Program has a minimum floor of 20% power. Reactor Cutback Rod Configuration should not be selected which would drop Reactor Power below 20% in the event of a Reactor Cutback.

3.2.4 All referenced pushbutton controls are on the Power Cutback module on CP-2, unless otherwise stated.

6.0 NORMAL OPERATIONS

6.1 ALIGNING REACTOR POWER CUTBACK FOR MANUAL CEA SUBGROUP SELECTION

6.1.1 Verify Section 5.1, Reactor Power Cutback System Standby Alignment, completed.

6.1.1.1 Depress LAMP TEST pushbutton and verify all pushbuttons on panel illuminate.

6.1.1.2 Release LAMP TEST pushbutton

6.1.2 Verify AUTO ACTUATE OUT OF SERVICE pushbutton Illuminated.

6.1.3 If the TEST RESET pushbutton is illuminated, then depress the TEST RESET pushbutton and verify pushbutton extinguishes.

6.1.4 Verify Reactor Pwr Cutback Single Chnl Trouble (L-5, Cabinet H) annunciator Clear.

6.1.4.1 If Reactor Pwr Cutback Single Chnl Trouble (L-5, Cabinet H) annunciator is not Clear, then realign Reactor Power Cutback in accordance with Section 5.1.

6.1.5 Verify MANUAL SELECT Illuminated on AUTO SELECT /MANUAL SELECT pushbutton.

6.1.6 Determine the appropriate CEA subgroup selection by performing Attachment 11.1, Manual CEA Subgroup Selection.

6.1.7 As determined from Attachment 11.1, manually align CEA subgroups for a Large Load Reject as follows:

6.1.7.1 Depress ENTER MANUAL SUBGRPS SELECT pushbutton and verify pushbutton Illuminates.

6.1.7.2 Establish CEA subgroup pattern by Depressing desired SUBGROUP SELECT pushbuttons and verifying each selected pushbutton Illuminates.

6.1.7.3 Depress LARGE LOAD REJECT pushbutton and verify pushbutton Illuminates.

6.1.7.4 When the SUBGROUP SELECT and LARGE LOAD REJECT pushbuttons have Extinguished (after approximately 60 seconds), then perform the following:

6.1.7.4.1 Depress DISPLAY SUBGRP SELECT pushbutton and verify pushbutton Illuminates.

6.1.7.4.2 Depress LARGE LOAD REJECT pushbutton and verify pushbutton Illuminates.

6.1.7.4.3 Verify correct CEA subgroup pattern is displayed.

6.1.8 As determined from Attachment 11.1, manually align CEA subgroups for a Loss of Feed Pump as follows:

6.1.8.1 Depress ENTER MANUAL SUBGRPS SELECT pushbutton and verify pushbutton Illuminates.

6.1.8.2 Establish CEA subgroup pattern by Depressing desired SUBGROUP SELECT pushbuttons and verifying each selected pushbutton Illuminates.

6.1.8.3 Depress LOSS OF FEED PUMP pushbutton and verify pushbutton Illuminates.

6.1.8.4 When the SUBGROUP SELECT and LOSS OF FEED PUMP pushbuttons have Extinguished (after approximately 60 seconds), then perform the following:

6. 1.8.4.1 Depress DISPLAY SUBGRP SELECT pushbutton and verify pushbutton Illuminates.

6.1.8.4.2 Depress LOSS OF FEED PUMP pushbutton and verify pushbutton Illuminates.

6.1.8.4.3 Verify correct CEA subgroup pattern is displayed.

NOTE

Turbine DEH System Program has a minimum floor of 20% power. A Reactor Cutback rod configuration should not be selected that would drop Reactor Power below 20% in the event of a Reactor Power Cutback.

6.1.9 Verify both Main Feedwater Pumps operating.

6.1.10 Depress AUTO ACTUATE OUT OF SERVICE pushbutton and verify pushbutton Extinguishes.

6.1.11 At SM/CRS discretion, remove Reactor Trip on Turbine Trip from service as follows:

6.1.11.1 On CP-2, place LOSS OF LOAD keyswitch to RPC.

6.1.11.2 On CP-7, place all four LOSS OF TURB BYPASS keyswitches to BYPASS and verify and all four red BYPASS lamps Illuminate.

6.1.11.3 On CP-2, place LOSS OF TURBINE TRIP keyswitch to DISABLE.

6.1.12 As Reactor Power and Core EFPD change, reevaluate manual CEA subgroup selection and change as necessary in accordance with Section 6.3, Changing Manual CEA Subgroup Selection. **[P-21931]**

11.1 MANUAL CEA SUBGROUP SELECTION

11.1.1	Current Reactor Power (PMC Point C24107)	_____ % PWR
11.1.2	Current EFPD (PMC Point C24110)	_____ EFPD
11.1.3	Number of Operable SBCS Valves	_____
11.1.4	Number of Operable SBCS Valves × 9.88 (Maximum Allowed Reactor Power after Reactor Cutback)	_____ % PWR
11.1.5	Minimum Allowed Reactor Power Level after Reactor Cutback (Turbine DEH System Program Floor in Automatic Control)	20% PWR
11.1.6	From Plant Data Book Figure 1.7.2.1, select CEA Subgroup 5 (Regulating Group 6) or CEA Subgroups 5 and 11 (Regulating Groups 6 and 5) such that the selections will allow Reactor Power to fall between 20% and the Maximum Allowed Reactor Power determined in Step 11.1.4. Use current Reactor Power and current EFPD with CEA Group Lines.	Subgroup 5 ☐ Subgroups 5 & 11 ☐ (check one)

Performed by: _____ _____
(Signature) (Date)

Verified by: _____ _____
(Signature) (Date)

SM/CRS Review: _____ _____/_____
(Signature) (Date/Time)

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CONTINUOUS USE

D. IMMEDIATE OPERATOR ACTIONS

1. Place Control Element Drive Mechanism Mode Select switch to AS.

2. Verify selected subgroups dropped.

Waterford 3

2009 NRC Exam

JOB PERFORMANCE MEASURE

S8

Secure Containment Purge

Applicant: _____

Examiner: _____

JOB PERFORMANCE MEASURE
DATA PAGE

Task: Secure Containment Purge

Task Standard: Applicant secures Containment Purge and Containment Airborne Radiation Removal System and updates the Containment Purge Cumulative Tracking Log.

References: OP-002-010, Reactor Auxiliary Building HVAC and Containment Purge
OP-008-009, Airborne Radioactivity Removal
OP903-001, Technical Specification Logs

Validation Time: 15 minutes Time Critical: No

Alternate Path: No

Applicant: _____

Time Start: _____ Time Finish: _____

Performance Time: _____ minutes

Performance Rating: SAT UNSAT

Comments: _____

_____

_____

_____

_____

Examiner: _____ Date: _____
Signature

EXAMINER COPY ONLY

Tools/Equipment/Procedures Needed:

OP-002-010, Reactor Auxiliary Building HVAC and Containment Purge
OP-008-009, Airborne Radioactivity Removal
OP-903-001, Technical Specification Logs

Description:
This task is performed at CP-18. The applicant must secure Containment Purge. He must evaluate if Airborne Radioactivity Removal Fan A must be secured based on Containment iodine level. After securing Containment Purge and Airborne Radioactivity Removal Fan A, the applicant must then update the Containment Purge Cumulative Hour log using OP-903-001, Technical Specification Logs.

READ TO APPLICANT

DIRECTION TO APPLICANT:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Indicate to me when you understand your assigned task.

INITIAL CONDITIONS:

The plant is in Mode 1.
Containment Purge was started at 2245 yesterday.

INITIATING CUES:

- The CRS directs you to secure Containment Purge.

TASK ELEMENT	STANDARD
Procedure note: Containment Purge should remain in service as much as practical during outage activities (e.g., Steam Generator primary side activities, Reactor Head disassembly, Reactor Cavity decontamination, Reactor Head inspections, etc.)	Note reviewed.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.6.1: Notify Radiation Protection that Containment Purge will be secured.	Notification made.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
Place RAB Vent Mode selector switch to Normal.	Switch is in Normal.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Procedure note: HVR-112 is failed to a fixed purge position. The closed and open limit switches are made up. The PMC will show this damper in the intermediate position.	Note reviewed.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
6.6.3 Verify following valves and dampers align as indicated: • HVR-112 (D52031) OPEN • HVR-115 (D52033) OPEN • HVR-116 (D52029) OPEN • CAP-202 (D51014) OPEN • CAP-203 (D51009) CLOSED • CAP-204 (D51011) CLOSED • CAP-205 (D51013) CLOSED • CAP-101 (D51019) CLOSED • CAP-102 (D51003) CLOSED • CAP-103 (D51005) CLOSED • CAP-104 (D51007) CLOSED	Positions verified.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
Secure Containment Airborne Radioactivity Removal System in accordance with OP-008-009, Airborne Radioactivity Removal.	Applicant transitions to OP-008-009.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
Procedure note: Airborne Radioactivity Removal Units should be secured when Containment Atmosphere Radiation Monitor (PRM-IRE-0100-AS) Iodine activity is < 2.5 x 10-9 µci/ml or as directed by SM/CRS.	Applicant verifies Containment iodine level using RM-11 computer.
Comment: Evaluator: Prompt the applicant to use the RM-11 screen at CP-35 to avoid interference with the other applicants. If applicant asks CRS if he directs securing ARRS, ask applicant for the value of Containment iodine.	**SAT / UNSAT**

TASK ELEMENT	STANDARD
OP-008-009, 7.1: Momentarily place control switch for Airborne Radioactivity Removal Units A, ARR-0002A, to Stop.	Fan is off.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
OP-002-010, 6.6.5: If plant is in Modes 1-4, then enter Containment Purge Hours in Cumulative Hours Tracking Log in accordance with OP-903-001, Technical Specification Surveillance Logs.	N/A
Comment: This step directs the applicant to update the Containment Purge Cumulative tracking Log. At this step, provided the applicant with the prepared log sheet.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
OP-903-001, 11.6.1.1: Enter the date and mode in the column Date/Mode.	Data entered.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
11.6.1.2: Enter the time the Purge was Initiated in the column Time Initiated. If the Purge was in service at 0000, then enter 0000.	Data entered.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
11.6.1.3: Enter the time the Purge was terminated in the column Time Terminated. If the Purge was continued at 2400, then enter 2400.	Data entered.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
11.6.1.4: Subtract column Time Initiated from column Time Terminated and enter the result in the column Time.	Data entered.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
11.6.1.5: Initial for performance of all of the entries in column Performed.	Data entered.
Comment: Inform applicant that the CRS will provide the paperwork to another operator for verification.	**SAT / UNSAT**

END OF TASK

APPLICANT CUE SHEET

(TO BE RETURNED TO EXAMINER TO UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

The plant is in Mode 1.
Containment Purge was started at 2245 yesterday.

INITIATING CUES:

- The CRS directs you to secure Containment Purge.

SIMULATOR OPERATOR INSTRUCTIONS

Reset to IC-99

There are no malfunctions or overrides for this JPM.

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MULTIPLE USE

3.0 PRECAUTIONS AND LIMITATIONS

3.1 PRECAUTIONS

3.1.1 Containment Purge Supply Isolation valves, CAP-103 and CAP-104, and Containment Purge Exhaust Isolation valves, CAP-203 and CAP-204, may be Open at no greater than the 52° Open position for <90 hours every 365 days while in Modes 1, 2, 3, and 4.

3.1.2 Gas Decay Tank release may be initiated concurrent with Containment Purge provided the following conditions are met:

- Containment Purge is in progress and Containment Purge is not on a Batch Release.
- If Containment Purge flow is interrupted or Plant Stack flow is changed, then GDT release shall be secured.

3.1.3 If Reactor Auxiliary Building (RAB) Normal Ventilation is to be secured for greater than 30 minutes, then a Controlled Ventilation Area System (CVAS) Filter Train should be started. During the period ventilation is secured, Radiation Protection should monitor the air in any area considered to be an unmonitored release path. If airborne levels are unacceptable, then RAB normal ventilation should be restored as soon as possible. The normal personnel access paths to the Controlled Access Area (CAA) in their standard configuration are not considered unmonitored release paths.

3.1.4 Do not operate CVAS Filter Units for non-emergency purposes if welding, burning, painting, or chemical cleaning activities are being performed within the CVAS boundary or RAB +46 HVAC room. **[CR-WF3-2005-03517]**

3.1.5 While in Modes 1 through 4, or during core alterations, or movement of irradiated fuel in containment, at least one containment purge isolation monitor per train must be operable with a setpoint of 40 mR/hr or ≤ 2 times background, whichever is higher.

Train A	Train B
ARMIRE5025	ARMIRE5024
ARMIRE5026	ARMIRE5027

3.1.6 One of the following Plant Stack Radiation Monitors must be operable in all modes. The operable Plant Stack Radiation Monitor Sample Pump must be operating prior to commencing Containment Purge.

Train A	Train B
PRMIRE0100-1	PRMIRE0100-2

3.1.7 Containment pressure should be ≤10 INWC before initiating Containment Purge. If this cannot be achieved, then in order to ensure that Steam Generator Blowdown Isolation does not occur, one train of CVAS should be started prior to purge operation.

3.1.8 If Met Tower Wind Speed is unavailable when attempting Containment Purge, then obtain a copy of EP-002-050, Offsite Dose Assessment (Manual), Attachment 7.6, Meteorological Data and Calculation of Atmosphere Dispersion Factors, Step 2.1.2, and contact the National Weather Service.

3.1.9 If ambient barometric pressure is <29.7 INHG (14.58 PSIA) during containment purge, then the minimum Technical Specification Containment pressure of 14.275 PSIA could be exceeded.

3.1.10 Containment Purge should not be initiated if meteorological conditions of CE-003-515, Gaseous Radioactive Waste Release Permit (Computer), can not be met.

3.1.11 Containment Purge should not be initiated with the Maintenance Hatch closed and Personnel Airlock Door Interlock defeated. This is a personnel safety risk with persons transiting the airlock.

3.1.12 If the RAB Supply Fan is secured, then the RAB Exhaust Fan shall be Secured for personnel safety.

3.1.13 If Condenser Vacuum Pump Discharge is diverted to the Plant Stack via RAB Normal Exhaust, securing RAB Normal Exhaust can result in a chemical gas build-up (Condensate System Controls) in the +46 HVAC Room as well as the +46 HVAC Penetration Area. This chemical build-up can pose a safety hazard to employees working in the immediate area.

3.1.14 Do not secure RAB Normal Exhaust if Containment Pressure Reduction is in progress, to prevent an unmonitored release from containment into the +46 HVAC Room as well as the +46 HVAC Penetration Area.

3.1.15 Lowering Containment pressure will cause indicated Containment Spray Riser Level to lower.

3.2 LIMITATIONS

3.2.1 Always Start HVAC Equipment Room Supply Fan, HVRMAHU0022, of same designation, A or B, as operating Exhaust Fan, HVRMFAN0024.

3.2.2 Always Start RAB Normal Supply Fan, HVRMFAN0002, of same designation, A or B, as operating Exhaust Fan, HVRMFAN0009.

3.2.3 Each time the Containment Purge Supply or Exhaust Dampers are Opened or Closed it shall be logged in the Operator's Log.

3.2.4 Inform Radiation Protection prior to Securing RAB Normal Ventilation. **[P-11562]**

3.2.5 Prior to securing RAB Normal Ventilation, notify Chemistry to suspend Fume Hood operation and give them an estimated duration that RAB Normal Ventilation will be secured.

3.2.6 CAP heater, CAPEEHC32B-4B, is designed to operate at “Full Purge” flow only (52° stops removed).

3.2.7 Containment Purge should remain in service as much as practical during outage activities (e.g., Steam Generator primary side activities, Reactor Head disassembly, Reactor Cavity decontamination, Reactor Head inspections, etc.) Radiation Protection should be notified prior to securing Containment Purge.

6.6 STOPPING CONTAINMENT PURGE WHILE MAINTAINING NORMAL VENTILATION [C]

NOTE

Containment Purge should remain in service as much as practical during outage activities (e.g., Steam Generator primary side activities, Reactor Head disassembly, Reactor Cavity decontamination, Reactor Head inspections, etc.)

6.6.1 Notify Radiation Protection that Containment Purge will be secured.

6.6.2 Place RAB Vent Mode selector switch to Normal.

NOTE

HVR-112 is failed to a fixed purge position. The closed and open limit switches are made up. The PMC will show this damper in the intermediate position.

6.6.3 Verify following valves and dampers align as indicated:

- HVR-112 (D52031) ..... OPEN
- HVR-115 (D52033) ..... OPEN
- HVR-116 (D52029) ..... OPEN
- CAP-202 (D51014) ..... OPEN
- CAP-203 (D51009) ..... CLOSED
- CAP-204 (D51011) ..... CLOSED
- CAP-205 (D51013) ..... CLOSED
- CAP-101 (D51019) ..... CLOSED
- CAP-102 (D51003) ..... CLOSED
- CAP-103 (D51005) ..... CLOSED
- CAP-104 (D51007) ..... CLOSED

6.6.4 Secure Containment Airborne Radioactivity Removal System in accordance with OP-008-009, Airborne Radioactivity Removal.

6.6.5 <u>If</u> plant is in Modes 1-4, <u>then</u> enter Containment Purge Hours in Cumulative Hours Tracking Log in accordance with OP-903-001, Technical Specification Surveillance Logs.

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REFERENCE USE

3.0 PRECAUTIONS AND LIMITATIONS

3.1 PRECAUTIONS

3.1.1 High humidity will reduce the effectiveness of ARR units to remove Airborne Radioactivity.

3.1.2 Stop ARR units upon receiving Containment Fire Alarm on Fire Detection Main Control Panel (FDMCP). 2

3.1.3 Stop ARR units on Hi Differential Pressure, Hi Charcoal Filter Temperature or Low Flow Computer Alarm conditions.

3.2 LIMITATIONS

NONE

7.0 SYSTEM SHUTDOWN

7.1 AIRBORNE RADIOACTIVITY REMOVAL SYSTEM SHUTDOWN

NOTE

Airborne Radioactivity Removal Units should be secured when Containment Atmosphere Radiation Monitor (PRM-IRE-0100-AS) Iodine activity is $\leq$ 2.5 x 10^{-9} μci/ml or as directed by SM/CRS.

7.1.1 Momentarily place control switch for Airborne Radioactivity Removal Units A(B), ARR-0002A(B), to Stop.

11.6 CONTAINMENT PURGE CUMULATIVE HOURS CALCULATION

11.6.1 If a Purge is performed in Modes 1-4, then perform the following on the Containment Purge Tracking Hours Calculation Data Sheet:

11.6.1.1 Enter the date and mode in the column Date/Mode.

11.6.1.2 Enter the time the Purge was Initiated in the column Time Initiated. If the Purge was in service at 0000, then enter 0000.

11.6.1.3 Enter the time the Purge was Terminated in the column Time Terminated. If the Purge was continued at 2400, then enter 2400.

11.6.1.4 Subtract column Time Initiated from column Time Terminated and enter the result in the column Time.

11.6.1.5 Initial for performance of all of the entries in column Performed.

11.6.1.6 Verifier check all entries and initial column Verified.

11.6.2 If a Purge was performed with the Plant in Modes 1-4, then complete the following on the Containment Purge Cumulative Hours/Daily Calculation Data Sheet, for the previous day, on the 19-07 shift:

11.6.2.1 Enter the date and mode in the column Date/Mode.

11.6.2.2 From the Containment Purge Cumulative Hours Tracking Data Sheet add all the entries in the column Time for the previous day and record in the column Purge Time.

11.6.2.3 Add column Purge Time to column Accumulated Purge Time and enter the result in column Sub Total.

11.6.2.4 Find the date 365 days past and record the value from column Purge Time from that date in column Purge Time Last YRS Date for the present Date.

11.6.2.5 Subtract column Purge Time Last YRS Date from column Sub Total and record this value in column Accumulated Purge Time.

11.6.2.6 Verify column Accumulated Purge Time result is <90 hours and record YES/NO in column <90 HRS.

11.6.2.7 Initial for performance of all of the entries in column Performed.

11.6.2.8 Verifier check all entries and initials in column Verified.

11.6.3 If a Containment Purge was not performed on the previous day, or the Plant was in Mode 5 or 6 on the previous day, then perform the following on the Containment Purge Cumulative Hours/Daily Calculation Data Sheet, on the 19-07 shift.

11.6.3.1 Enter the previous date and mode in the column Date/Mode.

11.6.3.2 Enter 0 in column Purge Time.

11.6.3.3 Add column Purge Time to the previous value in column Accumulated Purge Time and enter the results in column Sub Total.

11.6.3.4 Find the date 365 days and record the value from column Purge Time from that date in column Purge Time Last YRS Date for the present Date.

11.6.3.5 Subtract column Purge Time Last YRS Date from column Sub Total and record this value in column Accumulated Purge Time.

11.6.3.6 Verify column Accumulated Purge Time result is <90 hours and record YES/NO in column <90 HRS.

11.6.3.7 Initial for performance of all the entries in column Performed.

11.6.3.8 Verifier check all entries and initials in column Verified.

Containment Purge Cumulative Hours Tracking Data Sheet (Typical)

DATE/MODE	TIME INITIATED	TIME TERMINATED	TIME	PERFORMED (Initial)	VERIFIED (Initial)

Containment Purge Cumulative Hours/Daily Calculation Data Sheet (Typical)

DATE/MODE	PURGE TIME	SUB TOTAL	PURGE TIME LAST YRS DATE	ACCUMULATED PURGE TIME	<90 HRS YES/NO	PERFORMED (Initial)	VERIFIED (Initial)

Containment Purge Cumulative Hours Tracking Data Sheet (Typical)

DATE/MODE	TIME INITIATED	TIME TERMINATED	TIME	PERFORMED (Initial)	VERIFIED (Initial)
10/8/09 1	2245	2400	1.25	JS	MB
Applicant's copy					

Containment Purge Cumulative Hours Tracking Data Sheet (Typical)

DATE/MODE	TIME INITIATED	TIME TERMINATED	TIME	PERFORMED (Initial)	VERIFIED (Initial)
10/8/09 1	2245	2400	1.25	JS	MB
10/9/09 1	0000				

time FROM Simulator Clock

hours from 0000 to the time Recorded when purge was secured.

JPM S8

KEY

Waterford 3

2009 NRC Exam

JOB PERFORMANCE MEASURE

P1

Transfer EFW Pump Suctions to the Wet Cooling Tower after Condensate Storage Pool Depletion

Applicant: _____

Examiner: _____

JOB PERFORMANCE MEASURE
DATA PAGE

Task: Transfer EFW Pump Suctions to the Wet Cooling Tower after Condensate Storage Pool Depletion

Task Standard: Applicant aligns EFW Pump suction to the Auxiliary Component Cooling Water system.

References: OP-902-009, Standard Appendices
Appendix 10, Transferring EFW Pump Suction

Validation Time: 10 minutes Time Critical: No

Alternate Path: No

Applicant: _____

Time Start: _____ Time Finish: _____

Performance Time: _____ minutes

Performance Rating: SAT UNSAT

Comments: _____

_____

_____

_____

_____

Examiner: _____ Date: _____
Signature

EXAMINER COPY ONLY

Tools/Equipment/Procedures Needed:

OP-902-009, Appendix 10

Description:
This task is performed on the -35 level. The applicant must align EFW Pumps Suction to Auxiliary Component Cooling Water. The procedure directs this to be accomplished on only 1 train. This will be performed on Train A. Step 1.2 is a 30 minute hold step. The evaluator will tell the applicant that 30 minutes has elapsed at this point. PSA-W3-01-001, WSES-3 PSA Level-1 Model R4C1 Summary Report lists aligning EFW suction to the Wet Cooling Tower after CSP depletion as 1 of the top operator actions to prevent core damage.

READ TO APPLICANT

DIRECTION TO APPLICANT:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Indicate to me when you understand your assigned task.

INITIAL CONDITIONS:

- A loss of Main Feedwater event is in progress.
- The CRS has entered OP-902-006, Loss of Main Feedwater Recovery.
- Condensate Storage Pool Level is 25% and lowering.

INITIATING CUES:

- The CRS directs you to transferring EFW Pump suction to Auxiliary Component Cooling Water on Train A in accordance with OP-902-009, Appendix 10.

TASK ELEMENT	STANDARD
Procedure Note: CSP Indicated level will be lower than actual when drawing suction from the CSP. CSP Indicated level will be higher than actual when drawing suction from the ACCW system. When EFW suction is drawn from the CSP, consideration should be given to reducing flow to less than 500 gpm to read CSP level.	Reviewed note.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
Procedure note: Transfer of EFW Pump suction should be completed by a CSP level of 11% to prevent cavitation of EFW Pumps.	Reviewed note.
Comment:	**SAT / UNSAT**

TASK ELEMENT	STANDARD
1.1.a: Verify Auxiliary Component Cooling Water Pump A operating.	This should be done by simulating a call to the Control Room.
Comment: Evaluator: Respond as the CRS, and reply that ACCW Pump A is running.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
1.1.b: Close ACC 115A, Auxiliary Component Cooling Header A to Emergency Feedwater Drain.	Valve is closed.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
1.1.c: Unlock and open the following valves: • ACC 116A, Auxiliary Component Cooling Header A to Emergency Feedwater Isolation • ACC 114A, Auxiliary Component Cooling Header A Supply to EFW Header Isolation	Both valves are open.
Comment:	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
1.2: WHEN 30 minutes has elapsed, **THEN** close and lock the valves for the Train aligned in step 1: • ACC 116A • ACC 114A	Both valves are closed.
Comment: Evaluator: Prompt the applicant that 30 minutes have elapsed when this step is reached.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
1.3: Open Auxiliary Component Cooling Header to Emergency Feedwater Drain for the Train aligned in step 1: • ACC 115A	Valve is open.
Comment:	**Critical** **SAT / UNSAT**

END OF TASK

APPLICANT CUE SHEET

(TO BE RETURNED TO EXAMINER TO UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

- A loss of Main Feedwater event is in progress.
- The CRS has entered OP-902-006, Loss of Main Feedwater Recovery.
- Condensate Storage Pool Level is 25% and lowering.

INITIATING CUES:

- The CRS directs you to transferring EFW Pump suction to Auxiliary Component Cooling Water on Train A in accordance with OP-902-009, Appendix 10.

Emergency Operating Procedure
OP-902-009
Standard Appendices

OSRC Meeting No.: W3 07-23

Reviewed by: R Dodds 12/14/07

OSRC Chairman

Approved by: 12/17/07

General Manager - Plant Operations

Approval Date

12/20/2007

Effective Date

Continuous Use

Transferring EFW Pump Suction

INSTRUCTIONS CONTINGENCY ACTIONS

---------- **NOTE** ----------

CSP Indicated level will be lower than actual when drawing suction from the CSP. CSP Indicated level will be higher than actual when drawing suction from the ACCW system. When EFW suction is drawn from the CSP, consideration should be given to reducing flow to less than 500 gpm to read CSP level.

---------- **NOTE** ----------

Transfer of EFW Pump suction should be completed by a CSP level of 11% to prevent cavitation of EFW Pumps.

INSTRUCTIONS

CONTINGENCY ACTIONS

____ 1.1 Transfer Emergency Feedwater Pump suction to **ONE** side of the Auxiliary Component Cooling System as follows:

Train A

a. Verify Auxiliary Component Cooling Water Pump A operating.

b. Close ACC 115A, Auxiliary Component Cooling Header A to Emergency Feedwater Drain.

c. Unlock and open the following valves:

- ACC 116A, Auxiliary Component Cooling Header A to Emergency Feedwater Isolation
- ACC 114A, Auxiliary Component Cooling Header A Supply to EFW Header Isolation

(continue)

INSTRUCTIONS	CONTINGENCY ACTIONS
____ 1.1 (continued) **<u>Train B</u>** a. <u>Verify</u> Auxiliary Component Cooling Water Pump B operating. b. <u>Close</u> ACC 115B, Auxiliary Component Cooling Header B to Emergency Feedwater Drain. c. <u>Unlock</u> and <u>open</u> the following valves: • ACC 116B, Auxiliary Component Cooling Header B to Emergency Feedwater Isolation • ACC 114B, Auxiliary Component Cooling Header B Supply to EFW Header Isolation	
____ 1.2 **WHEN** 30 minutes has elapsed, **THEN** <u>close</u> and <u>lock</u> the valves for the Train aligned in step 1: • ACC 116A • ACC 116B • ACC 114A • ACC 114B	

INSTRUCTIONS	CONTINGENCY ACTIONS
____ 1.3 Open Auxiliary Component Cooling Header to Emergency Feedwater Drain for the Train aligned in step 1: • ACC 115A • ACC 115B	

End of Appendix 10

Waterford 3

2009 NRC Exam

JOB PERFORMANCE MEASURE

P2

Reset emergency Diesel Generator A following an Overspeed Trip with a LOOP

Applicant: _____

Examiner: _____

JOB PERFORMANCE MEASURE
DATA PAGE

Task: Reset emergency Diesel Generator A following an Overspeed Trip with a LOOP

Task Standard: Applicant resets Emergency Diesel Generator A in accordance with OP-009-002, Emergency Diesel Generator.

References: OP-009-002, Emergency Diesel Generator

Validation Time: 10 minutes Time Critical: No

Alternate Path: No

Applicant: _____

Time Start: _____ Time Finish: _____

Performance Time: _____ minutes

Performance Rating: SAT UNSAT

Comments: _____

_____

_____

_____

_____

Examiner: _____ Date: _____
Signature

EXAMINER COPY ONLY

Tools/Equipment/Procedures Needed:

OP-009-002, Emergency Diesel Generator, section 8.8.

Description:
This task is performed on the +21 level in Emergency Diesel Generator Room A. The applicant will simulate all actions in the EDG Room A. Manipulations 1 and 2 take place on the upper level of EDG A. The last manipulation takes place at the EDG A control panel.

READ TO APPLICANT

DIRECTION TO APPLICANT:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Indicate to me when you understand your assigned task.

INITIAL CONDITIONS:

- The plant has experienced a loss of off site power.
- Emergency Diesel Generator A tripped on overspeed.

INITIATING CUES:

- The CRS has directed you to reset Emergency Diesel Generator A.

TASK ELEMENT	STANDARD
Procedure note: (1) If the EDG was running in Emergency Mode and the signal for the EDG to Start still exists, then the EDG will automatically start when Steps 8.8.1 & 8.8.2 are completed. Step 8.8.3 should still be performed to prevent an EDG trip when the engine goes from Emergency Mode to Test Mode during paralleling operations. (2) Resetting the Combustion Air Intake Butterfly valve may take up to 30 seconds.	Note reviewed.
Comment: Evaluator: The cue states that there is a loss of off site power, so the applicant should conclude his actions will cause the EDG A to start. If asked, both EDG A Starting Air Receivers pressure are as they are currently indicated.	**SAT / UNSAT**

TASK ELEMENT	STANDARD
8.8.1: Reset the Turbocharger Butterfly Valve by performing one of the following: Depress and hold the EDG A Combustion Air Overspeed Trip Reset, EGA-418 A, pushbutton on the Governor until the Combustion Air Intake Butterfly Valve is reset. (pushbutton is located below the overspeed trip plunger on the side of the Overspeed Trip Block) Or Manually at the Combustion Air Intake Butterfly Valve.	Butterfly valve is reset.
Comment: Evaluator: When the reset push-button is depressed, the linkage will move and the sound of air flowing will be heard. This reset can take as long as 30 seconds, as is prompted in the note. The button is on the upper level of EDG A.	**<u>Critical</u>** **SAT / UNSAT**

TASK ELEMENT	STANDARD
8.8.2: Reset the Fuel Oil Overspeed Trip by pushing in the plunger on the Governor Overspeed Trip Block.	Plunger is pushed in.
Comment: Evaluator: The reset plunger is on the upper level of EDG A. After this is reset, EDG A will crank and start. If the applicant failed to accomplish the preceding step, then EDG A will not start.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
8.8.3: Push the System Reset pushbutton on the Emergency Diesel Generator A Control Panel.	Reset button is pressed.
Comment: The system reset button is located on the EDG Control Panel in the Diesel Room.	**Critical** **SAT / UNSAT**

END OF TASK

APPLICANT CUE SHEET

(TO BE RETURNED TO EXAMINER TO UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

- The plant has experienced a loss of off site power.
- Emergency Diesel Generator A tripped on overspeed.

INITIATING CUES:

- The CRS has directed you to reset Emergency Diesel Generator A.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 PRECAUTIONS

3.1.1 If the Jacket Water System has been drained and refilled, then the following should be performed:

3.1.1.1 Vent the Jacket Water tubing for the Woodward Speed Control Governor Oil Cooler using EG A(B) Governor Oil Cooler Jacket Water Outlet Vent, EGC-119 A(B). This is the high point vent for the Woodward Speed Control Governor Oil Cooler tubing.

3.1.1.2 Operate the Jacket Water Pumps for at least 5 minutes prior to energizing Jacket Water Heaters.

3.1.2 The Emergency Diesel Generator shall not be started with lube oil temperature <70°F, to prevent damage to the main lube oil filter elements.

3.1.3 Do not perform a rapid load of an EDG before verifying engine warmed up to ≥120°F and proper operation of Jacket Water Circulating Pump, Pre-Lube Oil Pump, and associated heaters.

3.1.4 Caution should be taken not to allow a Diesel Generator to run longer than required at unloaded or low load conditions.

3.1.5 When the EDG is operating unloaded or at low load conditions, then fuel injection pump temperatures may become too hot to comfortably hold your hand on, due to the pump not circulating fuel that would normally cool it. The time in this condition should be minimized for consideration of long term reliability of the fuel injection pumps.

3.1.6 When in Test Mode and paralleled to offsite, then the Diesel Generator shall not be operated for more than 6 hours at <50% load (2.2 MW) without loading the Diesel Generator to ≥3.3 MW for 15-30 minutes, to minimize buildup of unburned exhaust products.

3.1.7 When EDG is connected to the grid, always maintain outgoing reactive load (MVAR) and at least 0.1 MW real load to prevent a reverse power trip. EDG may trip if not loaded within 5 seconds after its output breaker is closed.

3.1.8 If possible, then do not operate unit when a shutdown occurs until the cause has been found and corrected.

3.1.9 The mechanical stops on EDG A(B) CCW Flow Control, CC-413A(B), shall not be adjusted without SM/CRS permission.

3.1.10 Do not use Maintenance Lube Oil Tank to store lube oil. This is applicable at all times.

3.1.11 If the Lube Oil System has been drained and refilled, then operate the Lube Oil Pumps for at least 5 minutes prior to energizing Lube Oil Heaters.

3.1.12 If the Fuel Oil System has been drained and refilled, then vent the Standby Fuel Oil Pump suction piping using EG A(B) Standby Fuel Oil Pump Suction Vent, EGF-12210 A(B).

3.1.13 EDG B should not be operated in parallel with the Main Generator when Main Generator voltage is >25.95 KV as indicated by PID A58003. Reactive load (MVAR) may be lowered to reduce Main Generator Voltage. Operating EDG B in parallel with the Main Generator when Main Generator voltage is >25.95 KV has the potential to cause the 3B32 bus breakers, upon a fault, to structurally decompose and explode. **[CR-WF3-2004-02220]**

3.1.14 Overfilling Main Governor with oil can adversely affect EDG performance by causing sluggish governor operation. 10 ml of oil will change sightglass level by roughly 1/16 of an inch.

3.1.15 To ensure the fuel oil consumption analysis remains valid, EDG frequency must be maintained ≤60.1 Hz. **[EC-11723, CR-WF3-2008-05183]**

3.2 LIMITATIONS

3.2.1 With one Emergency Diesel Generator Inoperable, the Operable Emergency Diesel Generator should not be paralleled to offsite or non-vital loads.

3.2.2 Continuously monitor Emergency Diesel Generator when operating. Monitoring an Emergency Diesel Generator while it is in operation does not require the assigned operator's physical presence in the room on a continuous basis. However, the operator's activities should be limited to ensure 1) an adequate assessment of engine operation and 2) timely identification and correction of problems. **[P-5549]**

3.2.3 If DC power is secured or lost to EDG A(B) Control Panel through EDG A(B) Control Panel Feeder #1 or #2, EG-EBKR-A(B)-11 or EG-EBKR-A(B)-12, then EG A(B) Fuel Oil Transfer Pump, EGF-EBKR-312A(B)-3F, should be Opened to prevent overflowing Feed Tank. When DC power is restored, then System Reset button on the EDG control panel should be depressed before Closing the EG A(B) Fuel Oil Transfer Pump breaker.

3.2.4 Do not run both Emergency Diesel Generators in test mode simultaneously, except when performing testing pursuant to Technical Specification Surveillance requirement 4.8.1.1.2.g.

3.2.5 During normal operation, Emergency Diesel Generator ratings of 4.4 MW for continuous loading and 4.84 MW for 2 hours out of any 24 hours should not be exceeded.

3.2.6 If during normal Emergency Diesel Generator operation, there is a significantly noticeable diesel exhaust plume visible for >6 minutes in any consecutive 60 minute period, then contact the Environmental Engineer to determine appropriate action by qualified personnel or comply with UNT-006-010, Event Notification and Reporting. Startup, shutdown, and emergency periods are exempt from this requirement. Smoke opacity can be accurately determined only during daylight conditions.

3.2.7 If an Emergency Diesel Generator starts in response to a loss of offsite power or other valid event, then ensure that makeup is available to the Emergency Diesel Generator Jacket Water System (EGC) from any source prior to shutting down the Emergency Diesel Generator and allowing it to cool.

3.2.8 When practical, the Diesel Generator should be operated in accordance with the following chart to minimize thermal stresses on the Diesel Engine to ensure optimum engine life and performance :

Diesel Generator Load ①	Hold Time
Start Unloaded	5 minutes
≥1.0 MW to 1.2 MW	5 minutes
≥2.1 MW to 2.3 MW	10 minutes
≥3.2 MW to 3.4 MW	10 minutes
≥4.0 MW to 4.4 MW	≥3.5 hours or at SM/CRS direction
0.5 MW to 1.0 MW	15 minutes

① The Emergency Diesel Generator should be loaded at a rate of approximately 0.5 MW/minute.

3.2.9 All shutdowns, with the exception of the overspeed and generator differential, are locked out during the Emergency Mode of Operation.

3.2.10 If control air is lost during any Emergency Diesel Generator run, then the Fuel Rack Override lever must be used to shutdown the Emergency Diesel Generator.

3.2.11 The Emergency Diesel Generator may continue to operate for up to 7 days following a loss of control air. Continuous operation exceeding 7 days may cause damage to the Turbocharger.

3.2.12 The Emergency Diesel Generator may be started with lube oil temperature <120°F but ≥70°F, if the following conditions are met for any non emergency start:

3.2.12.1 The pre-lube system should be operating for at least 30 minutes prior to starting the Emergency Diesel Generator with lube oil temperature ≥70°F.

3.2.12.2 If the Emergency Diesel Generator is started at a lube oil temperature of ≥70°F but <120°F, then the engine should not be loaded above 0.44 MW until lube oil and jacket water temperatures are ≥120°F.

3.2.13 Diesel Fuel Oil Storage Tank minimum levels are listed in the following table. Level may be as low as the 5-Day Minimum values for up to 5 days, provided replacement Fuel Oil is on site within the first 48 hours.
[TS 3.8.1.3, P-26756]

INSTRUMENT	7-DAY MINIMUM	5-DAY MINIMUM
PMC PIDs C60120, C60220	≥40,033 gallons	≥37,696 gallons
PMC PIDs C60121, C60221	≥98.25% full	≥92.51% full
EGF-ILI-6995A(B)	≥98.7% level	≥92.9% level
EGF-ILI-6993A(B)*	≥44'-5"	≥41'-11"

* EGF-ILI-6993A(B) should be used in the event of a loss of offsite power or if all other indicators are unavailable.

3.2.14 The fill limits for the Diesel Fuel Oil Storage Tanks are as follows:

<u>Lower fill limit:</u> **[TS 3.8.1.3, P-26756]**

- Using PMC PIDs C60120 and C60220 (C60121 and C60221): 40,160 gallons (98.56% Full)
- Using EGF-ILI-6995A(B): 98.8%

<u>Upper fill limit:</u>

- Using PMC PIDs C60120 and C60220 (C60121 and C60221): 40,480 gallons (99.34% Full)
- Using EGF-ILI-6995A(B): 99.3%
- Using EGF-ILI-6993A(B)*: 45'-9"
  - * EGF-ILI-6993A(B) should be used in the event of a loss of offsite power or if all other indicators are unavailable.

3.2.15 The Emergency Diesel Generator may be started with the jacket water temperature <120°F for any non-emergency start. The engine should not be loaded above 0.44 MW until the jacket water temperature is ≥120°F.

3.2.16 Any activity that may introduce air or which may pressurize EDG A(B) Fuel Oil Fill Line requires venting and depressurization of the line. **[CR-WF3-2008-00305]** Activities include but are not limited to:

- Fuel Oil receipt in accordance with OP-003-009, Fuel Oil Receipt and Transfer
- Testing Fuel Oil Transfer Pump A(B) the in accordance with OP-903-117, Emergency Diesel Generator Fuel Oil Transfer Pump Operability Check
- Maintenance that affects the EDG A(B) Fuel Oil Fill Line or associated components

3.2.16.1 Section 8.10, Venting and Depressurizing EDG A(B) Fuel Oil Fill Line, provides a method for venting and depressurizing EDG A(B) Fuel Oil Fill Line and may be used when equivalent instructions are not provided by the controlling activity or procedure.

8.8 RESETTING THE EMERGENCY DIESEL GENERATOR AFTER AN OVERSPEED TRIP

NOTE

(1) If the EDG was running in Emergency Mode and the signal for the EDG to Start still exists, then the EDG will automatically start when Steps 8.8.1 & 8.8.2 are completed. Step 8.8.3 should still be performed to prevent an EDG trip when the engine goes from Emergency Mode to Test Mode during paralleling operations.

(2) Resetting the Combustion Air Intake Butterfly valve may take up to 30 seconds.

8.8.1 Reset the Turbocharger Butterfly Valve by performing one of the following:

- Depress and hold the EG A(B) Combustion Air Overspeed Trip Reset, EGA-418A(B), pushbutton on the Governor until the Combustion Air Intake Butterfly Valve is reset. (pushbutton is located below the overspeed trip plunger on the side of the Overspeed Trip Block)

  or

- Manually at the Combustion Air Intake Butterfly Valve.

8.8.2 Reset the Fuel Oil Overspeed Trip by pushing in the plunger on the Governor Overspeed Trip Block.

NOTE

Depressing the System Reset pushbutton before the EDG has come to a complete stop may cause the unit to attempt to crank. **[CR-WF3-2005-00807]**

8.8.3 When Emergency Diesel Generator A(B) has come to a complete stop, then push the System Reset pushbutton on the Emergency Diesel Generator A(B) Control Panel.

Waterford 3

2009 NRC Exam

JOB PERFORMANCE MEASURE

P3

Align High Pressure Safety Injection Pump AB for Performance of OP-903-030, Safety Injection Pump Operability Check

Applicant: _____

Examiner: _____

JOB PERFORMANCE MEASURE
DATA PAGE

Task: Align High Pressure Safety Injection Pump AB for Performance of OP-903-030, Safety Injection Pump Operability Check

Task Standard: During alignment of HPSI Pump AB, applicant recognizes that SI-208 A, HPSI Pump A Discharge Isolation, reach rod malfunctions and informs the Control Room.

References: OP-903-030, Safety Injection Pump Operability Check
OP-903-011, High Pressure Safety Injection Pump Pre-service Operability Check
EN-OP-115, Conduct of Operations

Validation Time: 15 minutes Time Critical: No

Alternate Path: Yes

Applicant: _____

Time Start: _____ Time Finish: _____

Performance Time: _____ minutes

Performance Rating: SAT UNSAT

Comments: _____

_____

_____

_____

_____

Examiner: _____ Date: _____
Signature

EXAMINER COPY ONLY

Tools/Equipment/Procedures Needed:

OP-903-011, High Pressure Safety Injection Pump Pre-service Operability Check

Description:
This task is performed on the -15 level. The applicant will begin to align High Pressure Safety Injection Pump AB to replace HPSI Pump A. The fourth valve in the task, SI-208 A, a reach rod operated valve, will malfunction. The reach rod pin will bottom out prior to the valve reaching full closed position. The applicant should stop at this point and get shift management involved in the situation. The evaluator will ask the applicant what actions are necessary with the given indications. The applicant must be able to recall at least 3 items that are required to pass this task.

READ TO APPLICANT

DIRECTION TO APPLICANT:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Indicate to me when you understand your assigned task.

INITIAL CONDITIONS:

- HPSI Pump A is aligned in its normal alignment.
- HPSI Pump AB operability surveillance, OP-903-030, is scheduled to be completed.

INITIATING CUES:

- The CRS directs you to align HPSI Pump AB to replace A in accordance with OP-903-011, High Pressure Safety Injection Pump Pre-service Operability Check, section 7.1.
- Steps 10.1.1 through 10.1.6 have already been completed.

TASK ELEMENT	STANDARD
Complete the following valve lineup: Lock open SI-202 A, HPSI Pump AB Suction From HPSI A Isolation	Applicant simulates opening SI-202 A.
Comment: Evaluator: Provide indication that SI-202 A is unlocked and travels open. If the applicant asks, the position indicating pin moves freely side to side with the valve open.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Complete the following valve lineup: Lock open SI-212 A, HPSI pump AB Discharge To HPSI A Isolation	Applicant simulates opening SI-212 A.
Comment: Evaluator: Provide indication that SI-212 A is unlocked and travels open. If the applicant asks, the position indicating pin moves freely side to side with the valve open.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Complete the following valve lineup: Lock closed SI-203 A, HPSI Pump A Suction Isolation	Applicant simulates closing SI-203 A.
Comment: Evaluator: Provide indication that SI-203 A is unlocked and travels closed. If the applicant asks, the position indicating pin moves freely side to side with the valve closed.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Complete the following valve lineup: Lock closed SI-208 A, HPSI Pump A Discharge Isolation	Applicant discovers that the position indicating pin for SI-208 A bottoms out before the valve is closed.
Comment: Evaluator: Provide indication that SI-208 A is unlocked and travels closed. Provide cue that the position indicating pin hits the bottom of its travel while the applicant is simulating closing SI-208 A.	**Critical** **SAT / UNSAT**

TASK ELEMENT	STANDARD
Ask applicant requirements due to these indications.	From EN-OP-115, Conduct of Operations: If a valve position indicator pin bottoms out or tops out during repositioning or a dial indicator is not indicating correctly, then perform the following: 1. Verify valve position by at least one of the following methods: a. Local position indication b. Computer point indication c. Verification of system parameters (flow, pressure, etc.) 2. Generate a Caution Tag for the valve and hang the tag on the remote hand wheel. 3. Generate a Work Request on the reach rod post indicator. 4. Classify the work request as a Work Around or Burden as appropriate on the valve position verification.
Comment: Evaluator: Applicant must be able to recall at least 3 of these requirements.	**Critical** **SAT / UNSAT**

END OF TASK

APPLICANT CUE SHEET

(TO BE RETURNED TO EXAMINER TO UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

- HPSI Pump A is aligned in its normal alignment.
- HPSI Pump AB operability surveillance, OP-903-030, is scheduled to be completed.

INITIATING CUES:

- The CRS directs you to align HPSI Pump AB to replace A in accordance with OP-903-011, High Pressure Safety Injection Pump Pre-service Operability Check, section 7.1.
- Steps 10.1.1 through 10.1.6 have already been completed.

10.1 HPSI PUMP AB REPLACING HPSI PUMP A DATA SHEET

10.1.1 Obtain permission to replace HPSI Pump A with HPSI Pump AB.

0700 10/8/2009
SM/CRS (Signature) (Date/Time)

		Performed (initials)	Verified (Initials)
10.1.2	Verify AB Electrical Busses lined up from A Train.		
10.1.3	Place HPSI Pump A control switch in the Off position.		
10.1.4	Open HPSI Pump A Breaker knifeswitch.		
10.1.5	Rack down HPSI Pump A Breaker, SI-EBKR-3A-4.		
10.1.6	Verify PMI has isolated HPSI Pump AB Bearing Cooler CCW Low Flow Indicator Switch, CC-IFIS-7850C.		

10.1.7 Complete the following valve lineup:

Valve	Description	Req. Position		
SI-202A	HPSI Pump AB Suction From HPSI A Isolation	locked open		
SI-212A	HPSI pump AB Discharge To HPSI A Isolation	locked open		
SI-203A	HPSI Pump A Suction Isolation	locked closed		
SI-208A	HPSI Pump A Discharge Isolation	locked closed		
CC-930A	HPSI Pump A To AB CCW Supply Cross-Connect	locked open		
CC-931A	HPSI Pump AB To A CCW Supply Cross-Connect	locked open		
CC-945A	HPSI Pump AB To A CCW Return Cross-Connect	locked open		
CC-944A	HPSI Pump A To AB CCW Return Cross-Connect	locked open		
CC-934A	HPSI Pump A CCW Inlet Isolation	locked closed		
CC-942A	HPSI Pump A CCW Outlet Isolation	locked closed		
SI-205AB	HPSI Pump AB Min Flow To Recirc Line A Stop Check	locked open		
SI-245	HPSI Pump AB Min Flow To Recirc Line B Stop Check	locked closed		

		Performed (initials)	Verified (initials)
10.1.8	Verify PMI has vented and aligned to service HPSI Pump AB Bearing Cooler CCW Low Flow Indicator Switch, CC-IFIS-7850C	_____	
10.1.9	Locally verify HPSI Pump AB is ready to operate with proper lubrication and Component Cooling Water Flow.	_____	
10.1.10	Complete 4.16KV and 6.9KV Breaker Checklist, (OP-100-010, Equipment Out of Service),on HPSI Pump AB Breaker, SI-EBKR-3AB-3.	_____	
10.1.11	Energize Train A ESFAS Test Power Supply.	_____	
10.1.12	After approximately 1 minute, verify Test Enable indicator lit.	_____	
10.1.13	Place HPSI Pump AB assignment switch in A position.	_____	
10.1.14	Verify the following valves aligned as listed:		

Valve	Description	Req. Position		
SI-225A	HPSI Header A To RC Loop 1A FCV	closed	_____	_____
SI-226A	HPSI Header A To RC Loop 1B FCV	closed	_____	_____
SI-227A	HPSI Header A To RC Loop 2A FCV	closed	_____	_____
SI-228A	HPSI Header A To RC Loop 2B FCV	closed	_____	_____
SI-120A	SI Recirc Header A To RWSP Upstream Isolation	open	_____	_____
SI-121A	SI Recirc Header A To RWSP Downstream Isolation	open	_____	_____

10.1.15	Start HPSI Pump AB and verify proper manual start of HPSI Pump AB.	_____	
10.1.16	Stop HPSI Pump AB and place HPSI Pump AB control switch in Normal (mid) position.	_____	_____

NOTE

Position 10, Relay K110, will perform the functions listed below:
- Trip EDG A Output Breaker
- Start HPSI Pump AB
- Start LPSI Pump A

		Performed (initials)	Verified (initials)
10.1.17	Align Train A ESFAS Test Module to position 10.	_____	
10.1.18	Place LPSI Pump A control switch in Off position.	_____	
10.1.19	Verify EDG A Output Breaker Open.	_____	
10.1.20	Press and hold Initiate Actuation pushbutton until HPSI Pump AB starts, then release.	_____	
10.1.21	Align Train A ESFAS Test Module to Off position.	_____	
10.1.22	IF required, THEN place LPSI Pump A control switch in Auto position.	_____	_____
10.1.23	Stop HPSI Pump AB and place HPSI Pump AB control switch in Normal (mid) position.	_____	_____
10.1.24	IF not needed for further testing, THEN de-energize Train A ESFAS Test Power Supply.	_____	
10.1.25	Acceptance Criteria and Test Acceptance:		
	• Each valve in flow path is in its correct position in accordance with Technical Specification Surveillance Requirement 4.5.2.i.1.	_____	
	• HPSI Pump AB starts manually and upon receipt of a Train A SIAS signal in accordance with Technical Specification Surveillance Requirement 4.5.2.i.2.	_____	
	• IST Pump Data is current in accordance with OP-903-030, Safety Injection Pump Operability Verification (may be performed concurrent with this procedure), in accordance with Technical Specification Surveillance Requirement 4.5.2.i.3.	_____	

10.1 HPSI PUMP AB REPLACING HPSI PUMP A DATA SHEET (CONT'D)

REMARKS:_____

_____

_____

_____

Performed By: _____ _____/_____
Operator (Signature) (Date/Time)

Verified By: _____ _____/_____
Operator (Signature) (Date/Time)

Reviewed By: _____ _____/_____
SM/CRS (Signature) (Date/Time)

NOTE

HPSI pumps are categorized as Group B pumps since they support a standby system, which is not operated routinely. Group B pumps require three different type of test performances; a Group A, Group B, and Comprehensive Test.

- Group A Test should be used for post maintenance testing
  - o Group A Test requirements are not satisfied by Group B Test. Group B Test shall not be performed in place of Group A Test
  - o Group A Test requirements may be satisfied by performance of Comprehensive Test.
- Group B Test should be used for quarterly test
  - o Group B Test requirements may be satisfied by performance of either Group A Test or Comprehensive Test
- Comprehensive Test shall be used for biennial testing. Comprehensive Test is performed in OP-903-108

7.5 HPSI PUMP AB ALIGNED TO A HEADER

NOTE

RCS pressure must be ≥ 1750 psia for performance of this section.

7.5.1 Verify the following is recorded on Attachment 10.5, HPSI Pump AB Aligned to A Header IST Data:

- Type of test being performed: Group A Test or Group B Test
- SM/CRS permission to perform test
- Work Order number, if required
- If surveillance is being performed to establish reference data
- Instrument information

7.5.2 Replace HPSI Pump A with HPSI Pump AB in accordance with OP-903-011, High Pressure Safety Injection Pump Pre-service Operability Check.

7.5.3 Verify test instrument is installed for HPSI Pump AB suction pressure at HPSI Pump AB Suction Vent, SI-2032AB.

7.5.3.1 Open HPSI Pump AB Suction Vent, SI-2032AB.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 PRECAUTIONS

3.1.1 Verify Component Cooling Water is supplying cooling water to applicable HPSI Pump seal and bearing coolers prior to each non-emergency start.

3.1.2 Verify sufficient oil level is available for applicable HPSI Pump motor and pump bearings prior to each non-emergency start.

3.1.3 High pressure safety injection pumps shall not run for greater than 2 hours with only recirculation flow.

3.1.4 HPSI Pumps minimum recirculation flow shall be $\geq$25 GPM to prevent pump damage and $\leq$37 GPM to provide sufficient flow to the RCS.

3.2 LIMITATIONS

3.2.1 HPSI Pump AB can only replace the HPSI pump in same train as that to which the AB busses are aligned.

3.2.2 OP-903-030, Safety Injection Pump Operability Verification, may be performed concurrent with this procedure.

3.2.3 When HPSI Pump AB is not aligned to the A or B train, DC knife switch at breaker should be open and breaker racked down.

3.2.4 When HPSI Pump AB is aligned to replace HPSI Pump A(B), the DC knife switch at HPSI Pump A(B) should be open and the HPSI Pump A(B) breaker racked down.

3.2.5 Each pump start stresses motor windings both thermally and mechanically. A start means motor comes up to rated speed. Starts for HPSI pump should be limited as follows:

- With motor at ambient temperature, do not attempt more than 6 consecutive starts.
- With motor at operating temperature, do not attempt more than 3 consecutive starts.
- Allowed time between additional starts is 10 minutes with motor at operating temperature, or 15 minutes with motor at ambient temperature.

7.0 PROCEDURE

7.1 REPLACEMENT OF HPSI PUMP A BY HPSI PUMP AB

7.1.1. Obtain permission to perform Section 7.1 from SM/CRS and document on Attachment 10.1, HPSI Pump AB Replacing HPSI Pump A Data Sheet.

7.1.2 Perform replacement of HPSI Pump A by HPSI Pump AB in accordance with Attachment 10.1, HPSI Pump AB Replacing HPSI Pump A Data Sheet.

10.1 HPSI PUMP AB REPLACING HPSI PUMP A DATA SHEET

10.1.1 Obtain permission to replace HPSI Pump A with HPSI Pump AB.

_____/_____
SM/CRS (Signature) (Date/Time)

		Performed (initials)	Verified (Initials)
10.1.2	Verify AB Electrical Busses lined up from A Train.	_____	
10.1.3	Place HPSI Pump A control switch in the Off position.	_____	
10.1.4	Open HPSI Pump A Breaker knifeswitch.	_____	
10.1.5	Rack down HPSI Pump A Breaker, SI-EBKR-3A-4.	_____	
10.1.6	Verify PMI has isolated HPSI Pump AB Bearing Cooler CCW Low Flow Indicator Switch, CC-IFIS-7850C.	_____	
10.1.7	Complete the following valve lineup:		

Valve	Description	Req. Position		
SI-202A	HPSI Pump AB Suction From HPSI A Isolation	locked open	_____	_____
SI-212A	HPSI pump AB Discharge To HPSI A Isolation	locked open	_____	_____
SI-203A	HPSI Pump A Suction Isolation	locked closed	_____	_____
SI-208A	HPSI Pump A Discharge Isolation	locked closed	_____	_____
CC-930A	HPSI Pump A To AB CCW Supply Cross-Connect	locked open	_____	_____
CC-931A	HPSI Pump AB To A CCW Supply Cross-Connect	locked open	_____	_____
CC-945A	HPSI Pump AB To A CCW Return Cross-Connect	locked open	_____	_____
CC-944A	HPSI Pump A To AB CCW Return Cross-Connect	locked open	_____	_____
CC-934A	HPSI Pump A CCW Inlet Isolation	locked closed	_____	_____
CC-942A	HPSI Pump A CCW Outlet Isolation	locked closed	_____	_____
SI-205AB	HPSI Pump AB Min Flow To Recirc Line A Stop Check	locked open	_____	_____
SI-245	HPSI Pump AB Min Flow To Recirc Line B Stop Check	locked closed	_____	_____

		Performed (initials)	Verified (initials)
10.1.8	Verify PMI has vented and aligned to service HPSI Pump AB Bearing Cooler CCW Low Flow Indicator Switch, CC-IFIS-7850C	_____	
10.1.9	Locally verify HPSI Pump AB is ready to operate with proper lubrication and Component Cooling Water Flow.	_____	
10.1.10	Complete 4.16KV and 6.9KV Breaker Checklist, (OP-100-010, Equipment Out of Service),on HPSI Pump AB Breaker, SI-EBKR-3AB-3.	_____	_____
10.1.11	Energize Train A ESFAS Test Power Supply.	_____	
10.1.12	After approximately 1 minute, verify Test Enable indicator lit.	_____	
10.1.13	Place HPSI Pump AB assignment switch in A position.	_____	_____
10.1.14	Verify the following valves aligned as listed:		

Valve	Description	Req. Position		
SI-225A	HPSI Header A To RC Loop 1A FCV	closed	_____	_____
SI-226A	HPSI Header A To RC Loop 1B FCV	closed	_____	_____
SI-227A	HPSI Header A To RC Loop 2A FCV	closed	_____	_____
SI-228A	HPSI Header A To RC Loop 2B FCV	closed	_____	_____
SI-120A	SI Recirc Header A To RWSP Upstream Isolation	open	_____	_____
SI-121A	SI Recirc Header A To RWSP Downstream Isolation	open	_____	_____

10.1.15	Start HPSI Pump AB and verify proper manual start of HPSI Pump AB.	_____	
10.1.16	Stop HPSI Pump AB and place HPSI Pump AB control switch in Normal (mid) position.	_____	_____

10.1 HPSI PUMP AB REPLACING HPSI PUMP A DATA SHEET (CONT'D)

REMARKS:_____

_____

_____

_____

Performed By: _____ _____/_____
Operator (Signature) (Date/Time)

Verified By: _____ _____/_____
Operator (Signature) (Date/Time)

Reviewed By: _____ _____/_____
SM/CRS (Signature) (Date/Time)

Facility: WATERFORD 3 Scenario No.: 1 Op Test No.: **NRC**

Examiners: _____ Operators: _____

Initial Conditions:
- 100%, MOC, AB buses aligned to “B” side.
- Protected Train is B

Turnover:
- Maintain 100 % power
- Continue with Surveillance OP-903-094, section 7.20

Event No.	Malf. No.	Event Type*	Event Description
1	Di08A04S08-1	N – BOP TS - SRO	Perform surveillance OP-903-094, section 7.20. BD-103B fails to close.
2	RC15-A1	I – ATC I - SRO TS-SRO	Pressurizer level instrument RC-ILI-0110-X fails high
3	CC12-E2	I – BOP TS - SRO	Component Cooling Water Surge Tank level instrument CC-ILS-7013A fails low
4	FW21-A	R- ATC N-BOP N-SRO	Main Condenser leak with lowering Main Condenser vacuum requiring a Rapid Plant Power Reduction
5	RC23B	M-All	Small Break LOCA, SIAS and CIAS
	CC12-E2	C-ATC C - SRO	Secure Reactor Coolant Pumps due to the combination of event 3 and event 5.
6	SI02	C – BOP	Low Pressure Safety Injection Pump A fails to auto start on SIAS requiring manual start
7	CS01-A	C-BOP C-SRO	Containment Spray Pump A trip, OP-902-008, Safety Function Recovery Procedure Alignment of LPSI Pump A to replace CS Pump A

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

The crew assumes the shift at 100% power with instructions to maintain 100% power. Surveillance procedure OP-903-094, ESFAS Subgroup Relay Test – Operating, is in progress. The previous crew stopped at section 7.20, Train A Position 44, Relay K310 (BD-103B). This crew should resume testing. The BOP will secure Blowdown flow for Steam Generator #2 and test BD-103B, which will fail to close. The SRO should enter Tech Spec 3.6.3.

After briefing the failure, Pressurizer level instrument RC-ILI-0110X fails high. Due to the failure, Letdown flow goes to maximum flow of approximately 125 gpm and all Pressurizer Heaters energize. The SRO should enter OP-901-110, Pressurizer Level Control Malfunction. The crew should utilize sub section E1, Pressurizer Level Control Channel Malfunction. The ATC should take manual control of Pressurizer level and select the non-faulted channel. Using Tech Specs and OP-903-013, Monthly Channel Checks, the SRO should enter Tech Spec 3.3.3.5, a 7 day action requirement, and determine Tech Spec 3.3.3.6 entry is not required since QSPDS is operable and meeting the Pressurizer level channel check. SPDS indication of Pressurizer level is affected by this failure.

After the non-faulted channel is selected and Tech Specs are addressed, Component Cooling Water Surge Tank level instrument CC-ILS-7013A fails low. CCW Dry Cooling Tower A will bypass due to the failure. CCW Headers A and B will split, and CCW Loop AB supply and return from the A Header will close. The SRO should enter OP-901-510, Component Cooling Water System Malfunction. The BOP should use Attachment 1 to diagnose which instrument is failed. The crew should verify Auxiliary Component Cooling Water Pump A starts and control CCW system temperature with ACC-126 A. CCW Train A should be declared inoperable and 72 hour action Tech Spec 3.7.3 entered as well as cascading Tech Specs. The SRO should address the need to accomplish surveillance OP-903-066, Electrical Breaker Alignment Checks, within 1 hour to comply with Tech Spec 3.8.1.1.b. They must also address the need to accomplish the requirements of Tech Spec 3.8.1.1.d within 2 hours.

After the crew has addressed Tech Specs, a leak in the Main Condenser develops and Main Condenser vacuum begins to drop. Off normal procedure OP-901-220, Loss of Condenser Vacuum, should be entered. Main Condenser vacuum will drop below 25 inches, requiring a rapid plant power reduction. The SRO should enter OP-901-212, Rapid Plant Power Reduction. Vacuum will drop below 25 inches but remain above 20 inches, the procedure trigger for tripping the Reactor. For the power reduction, the ATC will perform direct Boration to the RCS as well as ASI control with CEAs and Pressurizer boron equalization. The BOP will manipulate the controls to reduce Main Turbine load.

Once the crew has commenced the power reduction and lowered power to ~ 90%, or at the lead examiner's discretion, a small break loss of coolant accident will occur. The crew should diagnose Pressurizer level dropping with all available Charging Pumps operating, trip the Reactor, and initiate Safety Injection Actuation (SIAS) and Containment Isolation Actuation (CIAS). Because of the earlier CCW level instrument failure, all CCW flow will be lost to the Reactor Coolant Pumps; the pumps must be manually secured within 3 minutes of the loss of CCW flow. When Containment Spray is actuated, either manually or automatically, CS-125B will fail to automatically open and will not open using the control switch. This does not create a need for action at this time, but Containment Spray flow will only be provided from Train A with CS-125B failed closed. Low Pressure Safety Injection Pump A will fail to automatically start on SIAS, requiring the BOP operator to manually start LPSI Pump A.

After the crew completes OP-902-000, Standard Post Trip Actions and diagnoses into OP-902-002, Loss of Coolant Accident Recovery, Containment Spray Pump A will trip, resulting in no Containment Spray flow. The crew should recognize that they are not meeting the Safety Function Status Checklist of OP-902-002 and transition to OP-902-008, Safety function Recovery Procedure.

Prioritization in OP-902-008 should result in Containment Isolation being priority 1 and Containment Temperature and Pressure Control being priority 2. The crew should address Containment Isolation by overriding CS-125A closed. The crew should address Containment Temperature and pressure Control by aligning Low Pressure Safety Injection Pump A to replace the failed Containment Spray Pump A. It is acceptable to pursue these tasks in parallel, since establishing flow with LPSI A to the Containment Spray header will also satisfy Containment Isolation concerns.

The scenario can be terminated after Low Pressure Safety Injection Pump A is aligned for Containment Spray, or after the CRS gives the order to perform that alignment, at the lead examiners discretion.

Critical Tasks

1. Trip any RCP not satisfying RCP operating limits.

This task is satisfied by securing all RCPs within 3 minutes of loss of CCW flow. This task is set up by the failure of CC-ILS-7013 A. The required task becomes applicable after SIAS is initiated following event 5. The time requirement of 3 minutes is based on the RCP operating limit of 3 minutes without CCW cooling.

2. Establish Containment temperature and pressure control.

This task is satisfied by aligning LPSI Pump A to replace CS Pump A prior to exiting the Containment Temperature and Pressure Control safety function in OP-902-008. This task becomes applicable following the failure of Containment Spray Pump A in event 7. The Functional Recovery procedure utilized following this failure will direct this activity to satisfy the Containment Pressure and Temperature Control safety function.

Scenario Notes:

A. Reset Simulator to IC-91.

B. Verify the following Scenario Malfunctions are loaded:

1. rc15a1 for Pressurizer level instrument RC-ILI-0110 X
2. cc12e2 for CCW Surge Tank level instrument failure, CC-ILS-7013 A
3. fw21a for Main Condenser vacuum leak
4. rc23b for SBLOCA
5. cs01a for Containment Spray Pump A trip
6. cs04b for CS-125 B fail to auto open
7. si02d for LPSI Pump A fail to auto start

C. Verify the following remotes

1. egr26 for EDG A local alarm acknowledgement
2. egr27 for EDG B local alarm acknowledgement

D. Verify the following overrides

1. di-08a07s22-1 for CS-125 B over-ride closed

E. Verify the following under Event Actions:

1. zdisgbdecs1565b.EQ.0 that performs the action set yx:sgbdmv103B=False.

F. Ensure Protected Train B sign is placed in SM office window.

G. Verify EOOS is 10.0 Green

H. Complete the simulator setup checklist.

I. With the simulator out of freeze, initiate trigger 1 before starting exam.

Simulator Booth Instructions

Event 1 BD-103 B Fails to Close during OP-903-094

1. If Work Week Manager or I&C is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.
2. If called as Chemistry regarding securing Blowdown, acknowledge communication.
3. If called to check BD-103 B locally, report BD-103 B stem appears bent.

Event 2 Pressurizer Level Instrument RC-ILI-0110X Fails High

1. On Lead Examiner's cue, initiate Event Trigger 2.
2. If Work Week Manager or I&C is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.
3. If called to check any Charging Pumps, report requested Charging Pump is ready for a start or is running normal, which ever is applicable.
4. If sent to LCP-43, report RC-ILI0110 X1 is failed high.

Event 3 CCW Level Switch CC-ILS-7013A Fails Low

1. On Lead Examiner's cue, initiate Event Trigger 3.
2. If Work Week Manager or I&C is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.
3. If called as RCA watch to check ACCW Pump A, report pump looked good on its start and is running normal.

Event 4 Main Condenser Leak, Rapid Power Reduction

1. On Lead Examiner's cue, initiate Event Trigger 4.
2. If called as TGB watch report all Air Evacuation Pumps look normal, no indications of a leak.
3. Approximately 5 minutes after being called to investigate, TGB watch should report finding a non-isolable leak up-stream of AE-401 A, Condenser Vacuum Breaker A. Location of failure is preventing any successful repair efforts.
4. If called as other watch standers to assist, respond that you are going to the TGB to assist.
5. If Work Week Manager is called, inform the caller that a team will be sent to the Turbine Building to assist.
6. If crew is slow to begin power reduction, reduce malfunction severity to 10%.

Event 5 Small Break LOCA Inside Containment

1. On Lead Examiner's cue, initiate Event Trigger 5.
2. If called as RCA watch report CS-125 B appears to be mechanically bound, the stem looks bent.
3. If called as RAB watch to check the Emergency Diesel Generators, initiate Trigger 10, EDG A & B Trouble alarms clear, report they are running satisfactorily.
4. If the Duty Plant Manager is called, inform the caller that he will make the necessary calls.

Event 6 Low Pressure Safety Injection Pump A fails to start

1. If called to check the LPSI Pump A breaker, report all indications are normal.
2. If called to check the LPSI Pump A locally, report all indications are normal.

Event 7 Containment Spray Pump A Trips

1. After the crew has entered OP-902-002 and on the Lead Examiner's cue, initiate Event Trigger 7.
2. If called to check the Containment Spray Pump A breaker, report over-current flags are picked up on all 3 phases.
3. If called to check the Containment Spray Pump A, report that there are visible charring on the motor with an acrid smell, but no indications of a fire or smoke.
4. If called for TSC concurrence, report SM/EC has granted concurrence.
5. If called as RAB watch to come to the Control Room for over-ride key for CS-125 A, acknowledge communication. Report to the Control Room on lead examiner's cue.
6. If crew does obtain key and over-rides CS-125 A closed, use remote CSR13A for the local key operation.

Scenario Timeline:

Event	Malfunction		Severity	Ramp HH:MM:SS	Delay	Trigger	Time (Min)
1	di-08a04s08-1		Open	N/A	N/A	N/A	
	BD-103 B Fails to close with MSIS signal						
2	RC15	A1	N/A	N/A	N/A	2	
	Pressurizer level instrument RC-ILI-0110 X fails high						
3	CC12	E2	0 %	N/A	NA	3	
	CCW Surge Tank level instrument CC-ILS-7013 A fails low						
4	FW21	A	20%	00:03:00	N/A	4	
	Main Condenser vacuum leak						
5	RC23B		.3%	00:02:00	N/A	5	
	Small Break LOCA ramping to 160 GPM to Containment						
5	CS04	B	N/A	N/A	N/A	N/A	
	CS-125 B fails to auto-open						
6	SI02	D	N/A	N/A	N/A		
	LPSI Pump A fails to auto start on SIAS						
7	CS01	A	TRUE	N/A	N/A	7	
	Containment Spray Pump A trips.						

REFERENCES:

Event	Procedures
1	OP-903-094, ESFAS Subgroup Relay Test – Operating Tech Spec 3.6.3
2	OP-901-110, Pressurizer Level Control Malfunction OP-903-013, Monthly Channel Checks Tech Spec 3.3.3.5
3	OP-901-510, Component Cooling Water System Malfunction OP-100-014, Technical Specification and Technical Requirements Compliance OP-903-066, Electrical Breaker Alignment Checks Tech Spec 3.7.3 and cascading Tech Specs to include 3.8.1.1
4	OP-901-220, Loss of Condenser Vacuum OP-901-212, Rapid Plant Power Reduction Tech Spec 3.1.3.6 Regulating and Group P CEA Insertion Limits
5	OP-902-000, Standard Post Trip Actions OP-902-002, Loss of Coolant Accident Recovery Procedure OP-902-009, Standard Appendices, Appendix 1, Diagnostic Flow Chart
7	OP-902-008, Safety Function Recovery Procedure OP-902-009, Standard Appendices, Appendix 28, Aligning LPSI to Replace CS

Op Test No.: NRC Scenario # 1 Event # 1 Page 1 of 19

Event Description: During surveillance OP-903-094, BD-103B fails to close

Time	Position	Applicant's Actions or Behavior
	BOP	Step 7.20.1 Verify Stm Gen 2 Blowdown Cntmt Isol Vlv, BD-103B, Open.
		• Control Switch is located on CP-8.
	BOP	Step 7.20.2 Lower Blowdown Flow SG2, BD-IHIC-0104-B, to zero percent output.
		• Both the Blowdown flow controller and Blowdown flow indication are located on CP-1.
	BOP	Step 7.20.3 Align ESFAS Test Module A to test position 44.
		• Located on CP-33, Train A
	BOP	Step 7.20.4 Press and Hold the INITIATE ACTUATION pushbutton.
		• Located on CP-33
	BOP	Step 7.20.5 Check component action listed for K310 on Attachment 10.1, Train A ESFAS Subgroup Relay Test - Operating.
	BOP	Step 7.20.6 Release the INITIATE ACTUATION pushbutton.
	CRS	Upon notification of BD-103B failure to auto close, evaluate Tech Specs.
		• Correct Tech Spec is 3.6.3 a-d. Blowdown is identified as a closed system, so the 72 hour action applies to the failure. The CRS may discuss the need to verify that the component is failed and not the test relay. If asked, the report from the field will assist in that decision.
Examiner Note This event is complete after Tech Spec 3.6.3 has been addressed Or As directed by the Lead Evaluator		

Op Test No.: NRC Scenario # 1 Event # 2 Page 2 of 19

Event Description: Pressurizer Level Instrument RC-ILI-0110-X Fails High

Time	Position	Applicant's Actions or Behavior
	ATC	Recognize and report indications of failed channel.
		Alarms:
		• PRESSURIZER LEVEL HI/LO (Cabinet H, B-1)
		• PRESSURIZER LEVEL HI-HI (Cabinet H, A-1)
		• LETDOWN FLOW HI/LO (Cabinet G, C-1)
		Indications
		• Mismatch between Charging (CVC-IFI-0212) AND Letdown (CVC-IFI-0202) flow indications
		• High level indicated on Pressurizer level indicator RC-ILI-0110 X
		• Deviation between actual level AND programmed level as indicated on Pressurizer level recorder (RC-ILR-0110)
	CRS	Enter and direct the implementation of OP-901-110, Pressurizer Level Control Malfunction.
	CRS	In section E0, General, of OP-901-110, direct use of sub-section E1.
	CRS	There is a note at the start of sub-section E1 that reads: Selecting the non-faulted channel may cause automatic actions to occur if actual level is not at program level. The CRS should evaluate this note and either wait for Pressurizer level to return to setpoint before selecting Channel Y or acknowledge that additional Charging Pumps may start as a result of selecting Channel Y. If he chooses to wait, it will take several minutes for Pressurizer level to return to setpoint. In this case, consider moving to malfunction 3 during the wait.
		All ATC manipulations are located on CP-2
	ATC	Step 1: Place Pressurizer Level Controller (RC-ILIC-0110) in MAN AND adjust OUTPUT to slowly adjust letdown flow to restore Pressurizer level.
	ATC	Step 2: Transfer Pressurizer Level Control CHANNEL SELECT switch to non-faulted channel.

Op Test No.: NRC	Scenario # 1	Event # 2	Page 3 of 19
Event Description:	Pressurizer Level Instrument RC-ILI-0110-X Fails High		

Time	Position	Applicant's Actions or Behavior
	ATC	Step 3: Transfer Pressurizer CHANNEL SELECT LO LEVEL HEATER CUTOFF switch to non-faulted channel.
	ATC / CRS	Step 4: Verify desired backup Charging pumps in AUTO.
	ATC	Step 5: Verify ALL PROPORTIONAL AND BACKUP HEATER BANKS reset.
	ATC	Step 6: Place Pressurizer Level Controller (RC-ILIC-0110) in AUTO and verify Pressurizer Level is being restored to setpoint.
	ATC / CRS	Step 7: Verify Pressurizer level controlling at program setpoint in accordance with Attachment 1, Pressurizer Level Versus Tave Curve.
	CRS	Step 8: Refer to Technical Specifications 3.3.3.5 and 3.3.3.6 for Remote Shutdown and Accident Monitoring operability determination.
		• OP-903-013, Monthly Channel Checks should be used to implement Tech Specs 3.3.3.5 and 3.3.3.6.
	CRS	Enter Tech Spec 3.3.3.5
		• Since QSPDS meets the channel check requirement of OP-903-013, entry into Tech Spec 3.3.3.6 is not appropriate.
		There will be a RCS pressure rise during this malfunction. The ATC may discuss the reactivity effects associated with this pressure rise. Waterford 3 does have an ODMI (Operations Decision Making Issue) with a trigger associated with a 50 PSIA change in RCS Pressure. This trigger should not be reached, but the CRS may discuss the ODMI and the actions should the trigger be reached.
Examiner Note This event is complete when Channel Y is selected for Pressurizer Level Control and for Pressurizer Lo Level Heater Cutout and after Tech Specs 3.3.3.5 and 3.3.3.6 have been addressed Or As directed by the Lead Evaluator		

Op Test No.:	NRC	Scenario #	1	Event #	3	Page	4	of 19

Event Description: Component Cooling Water Surge Tank Level Instrument CC-ILS-7013 A Fails Low

Time	Position	Applicant's Actions or Behavior
	BOP	Recognize and report indications of failed Component Cooling Water level switch.
		Alarms
		• CCW A Surge Tank Level Lost (Cabinet SA, B-5)
		• Dry Tower A Isolated (Cabinet B, N-9)
		• Aux CCW Sys A Press Lo Jockey Pump Trip/Trouble (Cabinet B, K-9)
		• CCW Makeup Pump A Running / Power Lost (Cabinet M, G-2)
		• Shutdown HX A CCW Flow Lo (Cabinet M, H-2)
		Indications
		• Component Cooling Water Makeup Pump A Starts, if in Auto, and runs for 3 minutes. Further Operation will require manually starting and stopping the pump.
		• Auxiliary Component Cooling Water Pump A auto-starts.
		• CC-134A, CCW A Dry Cooling Tower Bypass, Opens
		• CC-135A, CCW A Dry Cooling Tower Isolation, Closes
		• CC-126A/CC-114A, CCW Suct & Disch Header Tie Valves AB To A, Close
		• CC-126B/CC-114B, CCW Suct & Disch Header Tie Valves AB To B, Close
		• CC-200A/CC-727, CCW Suct & Disch Header Tie Valves A To AB, Close
		• CC-620, Fuel Pool Heat Exch's Temperature Control, Closes
	CRS	Enter and direct the implementation of OP-901-510, Component Cooling Water System Malfunction.
	BOP	Verify Auxiliary Component Cooling Water Pump A automatically starts and controls CCW temperature at setpoint.

Op Test No.:	NRC	Scenario #	1	Event #	3	Page	5	of 19

Event Description: Component Cooling Water Surge Tank Level Instrument CC-ILS-7013 A Fails Low

Time	Position	Applicant's Actions or Behavior
	CRS	In section E0, General, of OP-901-510: IF ANY of the following occur AND CCW Surge Tank level is in normal band, THEN refer to Attachment 1: CCW Surge Tank Level Switch Failures, to determine if malfunction is caused by failed level switch: • CCW Safety Headers automatically split • CCW AB Header automatically isolates • Dry Cooling Towers isolate and bypass • CCW Surge Tank makeup system malfunction causes Surge Tank overflow • Inability to auto makeup to the CCW Surge Tank • CCW Surge Tank Hi/Lo Level alarm
	BOP	Report that the failed level switch is CC-ILS-7013 A.
		• Attachment 1: CCW Surge Tank Level Switch Failures, lists several CCW level switches and their corresponding effects. The BOP should use this attachment and compare the indications and alarms to this attachment.
	CRS	Enter tech Spec 3.7.3 and cascading Tech Specs.
	CRS	Direct the performance of surveillance procedure OP-903-066, Electrical Breaker Alignment Check. This surveillance must be completed within 1 hour to comply with Tech Spec 3.8.1.1.b.
	CRS	Direct the verification of all B Train safety components that rely on EDG B are operable. Direct the verification that EFW Pump AB is operable. These verifications must be completed within 2 hours to comply with Tech Spec 3.8.1.1.d.
	BOP	At CP-8, verify Train B components and EFW Pump AB are operable. Verification includes verifying switch indications are normal and that no Train B annunciators are in alarm.

Examiner Note

This event is complete when Tech Specs 3.7.3 and cascading Tech Specs have been addressed

Or

As directed by the Lead Evaluator

This failure requires additional actions by the ATC after the initiation of SIAS.

Op Test No.:	NRC	Scenario #	1	Event #	4	Page 6	of 19
Event Description:	Main Condenser Leak, Lowering Main Condenser Vacuum, Rapid Plant Power Reduction						

Time	Position	Applicant's Actions or Behavior
	BOP	Recognize and report indications of lowering Main Condenser vacuum.
		Alarms
		• VACUUM PUMP A AUTO START (Cabinet E, E-1)
		• VACUUM PUMP B AUTO START (Cabinet E, E-2)
		• VACUUM PUMP C AUTO START (Cabinet E, E-3)
		Indications
		• Condenser Vacuum dropping on any of the following: o PMC alarms A01103 and A10203 o Wide Range Condenser Vacuum (CD-IPI-1902-B2) o Narrow Range Condenser Vacuum (CD-IPI-1901-B) o Condenser Vacuum recorder (CD-IPR-1902-A)
		• At 26 INHG, standby Condenser Vacuum Pump(s) start
	CRS	Enter and direct the implementation of OP-901-220, Loss of Condenser Vacuum.
	CRS	Step 1: Notify appropriate personnel that Condenser vacuum is dropping.
	CRS	NOTE 3 Normally, Circulating Water pumps should not be operated with intake bay river water level less than 0.0 Ft (at -0.7 Ft, consideration should be given to securing the Circulating Water pump) or operating current greater than 350 amps as noted on PMC.

	CRS	Step 3: Verify the following:
		• Sufficient number of Circulating Water Pumps are in operation
		• ALL operable Condenser Vacuum Pumps are in operation
		• ALL operating Condenser Vacuum Pumps Air Separator sightglasses are greater than half full of water
		• Gland Seal Header pressure is maintained between 100 and 140 psig
		• Gland Seal pressure being maintained between as follows:
		  • Between 1.3 to 3.0 psig for LP Turbine
		  • Between 2.0 to 8.0 psig for HP Turbine
		  • Approximately 4.0 psig for Main Feedwater Pumps
		• Condenser Vacuum Breaker Seals are full of water.

Op Test No.:	NRC	Scenario #	1	Event #	4	Page	7	of 19

Event Description: Main Condenser Leak, Lowering Main Condenser Vacuum, Rapid Plant Power Reduction

Time	Position	Applicant's Actions or Behavior
	CRS	Step 4: IF Condenser vacuum continues to drop below 25" Hg vacuum, THEN commence Plant power reduction in accordance with OP-901-212, Rapid Down Power.
	CRS	Establish a reactor trip criteria of > 20 Hg vacuum.
	CRS	Enter and direct the implementation of OP-901-212, Rapid Down Power.
	CRS	**NOTE** (1) A rapid power reduction is defined as approximately 30 MW/minute load reduction on the main turbine. (2) Power Reduction may be stopped at any point. (3) Some Steps of this procedure may not be applicable due to plant conditions. In these cases SM/CRS may NA the step. (4) Steps within this procedure may be performed concurrently or out of sequence with SM/CRS concurrence.
	ATC	Begin RCS Boration by <u>either</u> of the following methods as directed by the CRS: • Direct Boration • Emergency Boration using one Charging Pump
	CRS	Step 1: Begin RCS Boration by one of the following methods: up to 340 EFPD: Direct Boration or Emergency Boration using one Charging Pump
	ATC	Steps for Direct Boration:

Op Test No.:	NRC	Scenario #	1	Event #	4	Page	8	of 19

Event Description: Main Condenser Leak, Lowering Main Condenser Vacuum, Rapid Plant Power Reduction

Time	Position	Applicant's Actions or Behavior
		CAUTION (1) This section affects reactivity. This evolution should be crosschecked and completed prior to leaving CP-4. (2) At least one reactor coolant pump in each loop should be operating prior to performing direct boration operations to ensure proper chemical mixing.
		• 6.7.1 Inform SM/CRS that this Section is being performed.
		NOTE When performing a Plant down power where final RCS Boron Concentration needs to be determined, the following Plant Data Book figure(s) will assist the Operator in determining the required RCS Boron PPM change. 1.2.1.1 Power Defect Vs Power Level 1.4.3.1 Inverse Boron Worth Vs. Tmod at BOC (<30 EFPD) 1.4.4.1 Inverse Boron Worth Vs. Tmod at Peak Boron (30 EFPD up to 170 EFPD) 1.4.5.1 Inverse Boron Worth Vs. Tmod at MOC (170 EFPD up to 340 EFPD) 1.4.6.1 Inverse Boron Worth Vs. Tmod at EOC (>340 EFPD)
		• 6.7.2 At SM/CRS discretion, calculate volume of Boric Acid to be added on Attachment 11.6, Calculation of Boric Acid Volume for Direct Boration or VCT Borate Makeup Mode. • Should use Reactor Engineering Reactivity Worksheet
		• 6.7.3 Set Boric Acid Makeup Batch Counter to volume of Boric Acid desired.
		• 6.7.4 Verify Boric Acid Makeup Pumps selector switch aligned to desired Boric Acid Makeup Pump A(B).
		• 6.7.5 Place Direct Boration Valve, BAM-143, control switch to AUTO.
		• 6.7.6 Place Makeup Mode selector switch to BORATE.
		• 6.7.7 Verify selected Boric Acid Makeup Pump A(B) Starts.
		• 6.7.8 Verify Direct Boration Valve, BAM-143, Opens.
		• **NOTE** • The Boric Acid Flow Totalizer will not register below 3 GPM. The Boric Acid Flow Totalizer is most accurate in the range of 10 - 25 GPM.
		• 6.7.9 If manual control of Boric Acid flow is desired, then perform the following:
		• 6.7.9.1 Verify Boric Acid Flow controller, BAM-IFIC-0210Y, in Manual.

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Event Description: Main Condenser Leak, Lowering Main Condenser Vacuum, Rapid Plant Power Reduction

Time	Position	Applicant's Actions or Behavior
		• 6.7.9.2 Adjust Boric Acid Flow controller, BAM-IFIC-0210Y, output to >3 GPM flow rate.
		• 6.7.11 Verify Boric Acid Makeup Control Valve, BAM-141, Intermediate or Open.
		• 6.7.12 Observe Boric Acid flow rate for proper indication.
	Note	This manipulation is performed at CP-4. The ATC should use the Reactivity Worksheet to recommend a boron quantity to the CRS.
	ATC	Perform Boron Equalization as follows:
		• Place available Pressurizer Pressure Backup Heater Control Switches to ON.
		• Reduce Pressurizer Spray Valve Controller (RC-IHIC-0100) setpoint potentiometer to establish spray flow and maintain RCS pressure 2250 PSIA (2175 – 2265).
		This manipulation is performed at CP-2.
	ATC	Operate CEAs to maintain ASI using CEA Reg. Group 6 or Group P Control Element Assemblies. Operate CEAs in Manual Group mode as follows:
		• 6.7.1 Verify Plant Monitoring Computer operable in accordance with OP-004-012, Plant Monitoring Computer.
		• 6.7.2 Position Group Select switch to desired group.

		• 6.7.3 Place Mode Select switch to MG and verify the following:
		  • White lights Illuminated on Group Selection Matrix for selected group
		  • MG light Illuminates

		• 6.7.4 Operate CEA Manual Shim switch to WITHDRAW or INSERT group to desired height while monitoring the following:
		  • CEA Position Indicator selected CEA group is moving in desired direction
		  • If Reactor is critical, then monitor the following:
		  • Reactor Power
		  • Reactor Coolant System (RCS) temperature
		  • Axial Shape Index (ASI)

Op Test No.:	NRC	Scenario #	1	Event #	4	Page	10	of 19

Event Description: Main Condenser Leak, Lowering Main Condenser Vacuum, Rapid Plant Power Reduction

Time	Position	Applicant's Actions or Behavior
		NOTE The Operator should remain in the area in front of the CEA Drive Mechanism Control Panel when the Mode Select switch is not in OFF.
		6.7.5 When desired set of moves have been completed, then place Mode Select switch to OFF.
		CEA Group P should be used first to a low limit of 120 inches, followed by CEA Group 6 to a low limit of 120 inches to comply with Tech Spec 3.1.3.6.
		This manipulation is performed at CP-2.
	CRS	Notify the Load Dispatcher (Woodlands) that a rapid power reduction is in progress.
	CRS	Announce to Station Personnel over the Plant Paging System that a rapid plant power reduction is in progress.
	Crew	Maintain RCS Cold Leg Temperature 536°F to 549°F.

Op Test No.:	NRC	Scenario #	1	Event #	4	Page	11	of 19

Event Description: Main Condenser Leak, Lowering Main Condenser Vacuum, Rapid Plant Power Reduction

Time	Position	Applicant's Actions or Behavior
	BOP	Commence Turbine load reduction by performing the following:
		• Depress LOAD RATE MW/MIN pushbutton.
		• Set selected rate in Display Demand Window.
		• Depress ENTER pushbutton.
		• Depress REFERENCE pushbutton.
		• Set desired load in Reference Demand Window.
		• Depress ENTER pushbutton.
		• Depress GO pushbutton.
		This manipulation is performed at CP-1. The BOP will set up the Main Turbine controls. The ATC will direct the BOP when to commence unloading the Main Turbine based on the drop in RCS Cold Leg temperature.
	CRS	When Reactor Power consistently indicates less than 98% power, as indicated on PMC PID C24631 [MAIN STEAM RAW POWER (MSBSRAW)], or an alternate point provided by Reactor Engineering, then verify the value of C24648 [BSCAL SMOOTHING VAL. APPLD (DUMOUT17)] automatically changes to 1.
Examiner Note This event is complete when the desired power reduction has been accomplished Or As directed by the Lead Evaluator.		

Op Test No.: NRC Scenario # 1 Event # 5 / 6 Page 12 of 19

Event Description: Small Break LOCA, CCW lost to Reactor Coolant Pumps, CS-125 B Stuck Closed, Low Pressure Safety Injection Pump A Fails to Auto Start on SIAS.

Time	Position	Applicant's Actions or Behavior
	ATC / BOP	Recognize and report indications of RCS Leak.
		Alarms
		• Containment Water Leakage Hi (Cabinet N, L-20)
		• Containment Water Leakage Hi-Hi (Cabinet N, K-20)
		• Class 1E Rad Monitoring Sys Activity Hi-Hi (Cabinet SA, K-4)
		Indications
		• Lowering Pressurizer level.
		• Lowering Pressurizer pressure.
		• Backup Charging Pumps auto-start until all 3 Charging Pumps are running.
	ATC	If directed by CRS, trip Reactor using 2 Reactor Trip pushbuttons at CP-2.
	ATC	If directed by CRS, initiate Safety Injection Actuation (SIAS) and Containment Isolation Actuation (CIAS) at CP-7.
Critical Task Trip any RCP not satisfying RCP operating limits. This task is satisfied by securing all RCPs within 3 minutes of loss of CCW flow.		
	ATC	Following initiation of SIAS (auto or manual) secure all running Reactor Coolant Pumps as follows: • Place each RCP control switch to stop.
		This is done at CP-2. This step is required here because of the earlier failure of CCW level switch CC-ILS-7013A. At this point, the RCPs will be operating with no CCW flow.
	CRS	Direct ATC and BOP to carry out Standard Post trip Actions.

Op Test No.:	NRC	Scenario #	1	Event #	5 / 6	Page	13	of 19

Event Description: Small Break LOCA, CCW lost to Reactor Coolant Pumps, CS-125 B Stuck Closed, Low Pressure Safety Injection Pump A Fails to Auto Start on SIAS.

Time	Position	Applicant's Actions or Behavior
	ATC	Determine **Reactivity Control** acceptance criteria are met: • Check reactor power is dropping. • Check startup rate is negative. • Check less than **TWO** CEAs are **NOT** fully inserted.
	BOP	Determine **Maintenance of Vital Auxiliaries** acceptance criteria are met: Check the Main Turbine is tripped: • Governor valves closed • Throttle valves closed
	BOP	Check the Main Generator is tripped: • GENERATOR BREAKER A tripped • GENERATOR BREAKER B tripped • EXCITER FIELD BREAKER tripped
	BOP	Check station loads are energized from offsite electrical power as follows: **Train A** • A1, 6.9 KV non safety bus • A2, 4.16 KV non safety bus • A3, 4.16 KV safety bus • A-DC electrical bus • A or C vital AC Instrument Channel **Train B** • B1, 6.9 KV non safety bus • B2, 4.16 KV non safety bus • B3, 4.16 KV safety bus • B-DC electrical bus B or D vital AC Instrument Channel

Op Test No.:	NRC	Scenario #	1	Event #	5 / 6	Page	14	of 19

Event Description: Small Break LOCA, CCW lost to Reactor Coolant Pumps, CS-125 B Stuck Closed, Low Pressure Safety Injection Pump A Fails to Auto Start on SIAS.

Time	Position	Applicant's Actions or Behavior
	ATC	Determine **RCS Inventory Control** acceptance criteria are met: Check that the following conditions exist: • Pressurizer level is 7% to 60% • Pressurizer level is trending to 33% to 60% • Check RCS subcooling is greater than or equal to 28ºF.
	ATC	Determine **RCS Pressure Control** acceptance criteria are met by checking that **BOTH** of the following conditions exist: • Pressurizer pressure is 1750 psia to 2300 psia • Pressurizer pressure is trending to 2125 psia to 2275 psia
		IF pressurizer pressure is less than 1684 psia, **THEN** verify the following have initiated. • SIAS • CIAS
	BOP	Start Low Pressure Safety Injection Pump A at CP-8.
	ATC	Determine **Core Heat Removal** acceptance criteria are met: • Check at least one RCP is operating. • Check operating loop ΔT is less than 13ºF. • Check RCS subcooling is greater than or equal to 28ºF.
		This should be N/A since all RCPs should have been secured due to the earlier CCW level Switch failure.
	BOP	Determine **RCS Heat Removal** acceptance criteria are met: Check that at least one steam generator has **BOTH** of the following: • Steam generator level is 5% to 80% NR • Main Feedwater is available to restore level within 50%-70% NR.
	ATC	Check RCS TC is 530ºF to 550ºF
	BOP	Check steam generator pressure is 885 psia to 1040 psia.

Op Test No.:	NRC	Scenario #	1	Event #	5 / 6	Page	15	of 19

Event Description: Small Break LOCA, CCW lost to Reactor Coolant Pumps, CS-125 B Stuck Closed, Low Pressure Safety Injection Pump A Fails to Auto Start on SIAS.

Time	Position	Applicant's Actions or Behavior
	BOP	Check Feedwater Control in Reactor Trip Override: • MAIN FW REG valves are closed • STARTUP FW REG valves are 13% to 21% open • Operating main Feedwater pumps are 3800 rpm to 4000 rpm
	Note	With MSIS in, MAIN FW REG valves and STARTUP FW REG valves will be closed.
	BOP	Reset moisture separator reheaters, and check the temperature control valves closed.
	ATC	Determine **Containment Isolation** acceptance criteria are met: • Check containment pressure is less than 16.4 psia. • Check **NO** containment area radiation monitor alarms **OR** unexplained rise in activity. • Check **NO** steam plant activity monitor alarms **OR** unexplained rise in activity.
		IF containment pressure is greater than or equal to 17.1 psia, **THEN** verify the following: • CIAS is initiated • SIAS is initiated • MSIS is initiated
	BOP	Determine **Containment Temperature and Pressure Control** acceptance criteria are met: • Check containment temperature is less than or equal to 120ºF. • Check containment pressure is less than 16.4 psia.
		IF containment pressure is greater than or equal to 17.7 psia, **THEN** verify **ALL** of the following: • CSAS is initiated • **ALL** available containment spray pumps are delivering flow greater than 1750 gpm • **ALL** RCPs are secured

Op Test No.:	NRC	Scenario #	1	Event #	5 / 6	Page	16	of 19

Event Description: Small Break LOCA, CCW lost to Reactor Coolant Pumps, CS-125 B Stuck Closed, Low Pressure Safety Injection Pump A Fails to Auto Start on SIAS.

Time	Position	Applicant's Actions or Behavior
	BOP	After Containment Spray is initiated (CSAS), attempt to open CS-125 B. • Valve will not open when this action is taken. • Verify > 1750 GPM Containment Spray flow on Train B. • This action is taken at CP-8.
	BOP	Secure AH-12 A or B on CRS direction after initiation of SIAS at CP-18.
	CRS	After review of Standard Post Trip Actions, use Appendix 1, Diagnostic Flow Chart of OP-902-009 to select appropriate optimal recovery procedure. • Proper use of chart will result in use of OP-902-002, Loss of Coolant Accident Recovery
	Crew	When Containment Temperature rises above 200 F, update crew on need to use bracketed parameters due to harsh environment in Containment.
	CRS	During brief in OP-902-002, should discuss necessary strategy of using Steam Generators to cool RCS.

Examiner Note

This event is complete after entry into OP-902-002. It is not necessary to allow a brief to occur at this point. SIAS initiation verification and CSAS verification should occur before moving forward. ATC should have secured RCPs and the BOP should have started LPSI Pump A.

Op Test No.:	NRC	Scenario #	1	Event #	7	Page	17	of 19

Event Description: Containment Spray Pump A Trips, Entry into OP-902-008, Safety Function Recovery Procedure

Time	Position	Applicant's Actions or Behavior
	ATC / BOP	Recognize and report indications of Containment Spray Pump A trip.
		Alarms
		• CNTMT Spray Pump A Unavailable (Cabinet M, A-4)
		• CNTMT Spray Pump A Trip/Trouble (Cabinet M, B-4)
		• CNTMT Spray Hdr A Flow Lo (Cabinet M, F-4)
		Indications
		• Amber light on Containment Spray Pump A control switch.
		• No Containment Spray flow indicated on CS-IFI-.7122 A.
	CRS	Recognize the Containment Temperature and Pressure Control safety function is not met. Exit OP-902-002 and enter OP-902-008, Functional Recovery procedure.
	BOP	Place Hydrogen Analyzers in service as follows:
		• **Train A**
		o Place Train A H2 ANALYZER CNTMT ISOL VALVE keyswitch to OPEN.
		o Place H2 ANALYZER A POWER to ON.
		o Check H2 ANALYZER A Pumps indicate ON.
		• **Train B**
		o Place Train B H2 ANALYZER CNTMT ISOL VALVE keyswitch to OPEN.
		o Place H2 ANALYZER B POWER to ON.
		o Check H2 ANALYZER B Pumps indicate ON.

Op Test No.:	NRC	Scenario #	1	Event #	7	Page	18	of 19

Event Description: Containment Spray Pump A Trips, Entry into OP-902-008, Safety Function Recovery Procedure

Time	Position	Applicant's Actions or Behavior
	CRS	Identify success paths to be used and prioritize Safety Functions.
		Proper prioritization will result in Containment Isolation being priority 1 and Containment Temperature and Pressure Control being priority 2. • The CRS may request plant data from the ATC and BOP operators during his prioritization. The CRS may ask for the BOP to verify Safety Injection Pumps are meeting the flow curves of OP-902-009, Appendix 2. Both High and Low Pressure Safety Injection Pumps are meeting their flow curves. • The CRS should address Containment Isolation by overriding CS-125 A closed. OP-902-008, section CI-1 will direct this to be accomplished in accordance with OP-902-009, Standard Appendices, Attachment 21-A. This requires the RAB Watch to come to the Control Room and obtain a key from the Shift Manager's office. • The CRS should address Containment Temperature and Pressure Control by aligning Low Pressure Safety Injection Pump A to replace the failed Containment Spray Pump A. OP-902-008, section CTPC, Continuing Actions will direct this to be accomplished in accordance with OP-902-009, Standard Appendices, Attachment 28. • These actions should be pursued in parallel. The CR may choose to prepare for, but not close, CS-125 A, pending attempts to accomplish aligning LPSI Pump A. Establishing flow through CS-125 A with LPSI Pump A will remove the requirement to close CS-125 A.

Op Test No.:	NRC	Scenario #	1	Event #	7	Page	19	of 19

Event Description: Containment Spray Pump A Trips, Entry into OP-902-008, Safety Function Recovery Procedure

Time	Position	Applicant's Actions or Behavior
Critical Task Establish Containment temperature and pressure control. This task is satisfied by aligning LPSI Pump A to replace CS Pump A prior to exiting the Containment Temperature and Pressure Control safety function in OP-902-008.		
	BOP	Align LPSI Pump A to replace CS Pump A as follows:
		• Verify LPSI Pump A control switch in OFF.
		• Verify Containment Spray Pump A control switch in OFF.
		• Place SI-129A, LPSI FLOW CONTROL VALVE to AUTO.
		• Place SI-IFIC-0307, LPSI FLOW CONTROLLERS HEADER 2A/2B in MAN.
		• Adjust SI-IFIC-0307, LPSI FLOW CONTROLLERS HEADER 2A/2B to 0% output.
		• Verify the following valves Closed:
		o SI-415A, LPSI SHUTDOWN TEMP CONTROL valve.
		o SI-138A, LPSI FLOW CONTROL COLD LEG 2B.
		o SI-139A, LPSI FLOW CONTROL COLD LEG 2A.
		• Open SI-125A/SI-412A, SHDN HX A ISOL valves.
		• Verify CS-125A, CNTMT SPRAY HEADER ISOL valve open.
		• Start LPSI Pump A.
Examiner Note This event is complete after aligning LPSI Pump A to replace CS Pump A Or As directed by the Lead Evaluator.		

Facility: WATERFORD 3 Scenario No.: 3 Op Test No.: **NRC**

Examiners: _____ Operators: _____

Initial Conditions:
- 1.2 % Power
- Power ascension is being held pending Main Feedwater Pumps governor adjustment
- Preparations are being made to start Main Feedwater Pump A
- AB Bus is aligned to the A side

Turnover:
- OP-903-052 for CVAS Train A will go late this shift. Complete OP-903-052, section 10.1.
- OP-007-004, attachment 11.4 is in the field to discharge Waste Condensate Tank A.

Event No.	Malf. No.	Event Type*	Event Description
1	DI-18A4s27-1	N – BOP N - SRO TS – SRO	During performance of OP-903-052, CVAS Fan A will fail to start.
2	AO-04A3a12c-3	C – ATC C – SRO	Waste Condensate Tank A flow controller LWM-IFIC-0647 output fails high
3	CH08-A1	I – BOP I - SRO TS – SRO	Containment pressure instrument CB-IPT-6701-SMC fails high
4	RX14-A	I – ATC I - SRO	Pressurizer pressure instrument RC-IPR-0100 X fails low
5	RX06-D1	C – BOP C - SRO	Steam Bypass Valve MS-320 A fails open
6	FW38-B	M – ALL	Main Feedwater line break in Containment.
7	RP08G	C – BOP C - SRO	Main Feedwater Isolation Valve #1 FW-184A fails to automatically close on MSIS.
8	RP09D	C – ATC C - SRO	RC-606 and FP-601 B fail to auto close on CIAS.

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

The crew assumes the shift at 1.2 % power. Reactor Engineer has completed Low Power Physics Testing. I&C Techs are making adjustments to Main Feedwater Pumps A & B governors based on vendor recommendations. The estimated time to completion is less than 60 minutes. When this is complete, Main Feedwater Pump A will be started and power ascension will commence.

Last shift, it was discovered that OP-903-052, CVAS Operability Test, will exceed its Tech Spec late date this shift. You have been directed to start CVAS Train A in accordance with OP-903-052. This surveillance will have the BOP operator secure RAB Normal Supply and Normal Exhaust Fans A and start CVAS Fan A. After securing both normal ventilation fans, CVAS Fan A will fail to start. This will require entering Tech Spec 3.7.7, a 7 day action requirement. RAB Normal Supply and Normal Exhaust Fans A will have to be re-started.

After the failure of CVAS Fan A, the RCA watch will call and report that he has completed his lineup and is ready for the ATC to perform his actions to discharge Waste Condensate Tank A and is ready for the ATC to continue with step 6.10.7. When the ATC initiates flow on step 6.10.10, LWM-IFIC-0647 will fail high, raising flow in excess of 50 gpm, the discharge permit limit. The ATC should close LWM-441 and LWM-442 from CP-4 to terminate the release.

After the release is secured, Containment pressure instrument CB-IPT-6701 SMC fails high. The SRO should enter Tech Spec 3.3.1 and 3.3.2 and the BOP should bypass PPS bistables 13 and 16.

After the appropriate bistables are bypassed, Pressurizer pressure instrument RC-IPR-0100 X fails low. This causes Pressurizer Backup and Proportional heaters to energize. The SRO should enter OP-901-120, Pressurizer Pressure Malfunction. The ATC will select the non-faulted Pressurizer pressure channel.

After the Pressurizer Pressure Control Channel Y is selected, Steam Bypass valve MS-320A controller will begin to fail high. The crew should respond to the cooldown and reactivity effects by taking manual control of MS-320 A and closing it.

After MS-320 A is closed, a Main Feedwater line break occurs in Containment. If the control room supervisor directs a reactor trip based on the un-controlled power rise, then the trigger for the Main Feedwater line break will be inserted while the crew is performing their standard post trip actions. After the malfunction is inserted, the Main Feedwater Isolation Valve #1 fails to automatically close on the MSIS and must be closed manually by the BOP operator. RC-606 and FP-601 B fail to automatically close on the CIAS and must be manually closed by the ATC and BOP operators. The crew should enter OP-902-004, Excess Steam Demand Recovery.

Actions to address pressurized thermal shock should be taken when CET temperature and Pressurizer pressure start to rise. This can be accomplished using OP-902-009, Appendix 13 or with OP-902-004, based on whether or not the crew has diagnosed into OP-902-004 before those parameters start to rise. The scenario can be terminated after PTS actions have been accomplished or at the lead examiners discretion.

The conditions in this scenario do not warrant declaration of any Emergency Plan Classification.

Critical Tasks

1. Establish Containment Isolation

   This task is satisfied by taking action to close FW-184 A.

2. Trip any RCP not satisfying RCP operating limits.

   This task is satisfied by securing all RCPs within 3 minutes of CSAS initiation.

3. Establish RCS temperature control

   This task is satisfied by taking action to stabilize RCS temperature within the limits of the RCS P/T curve using ADV #1 and establishing EFW flow to Steam Generator #1. Action to address this task should commence within 10 minutes after the applicable parameters begin to rise.

4. Establish RCS pressure control

   This task is satisfied by taking action to stabilize RCS pressure within the limits of the RCS P/T curve and additionally maintain RCS pressure within 1500-1600 psid of the faulted steam generator. Action to address this task should commence within 10 minutes after the applicable parameters begin to rise.

Scenario Notes:

A. Reset Simulator to IC-93.
    1. Use keys 165 – 168 for S/G high level bypass setup.
B. Verify the following Scenario Malfunctions:
    1. cho8a1 for Containment pressure CB-IPT-6701 SMC
    2. rx14-A for Pressurizer pressure instrument RC-IPT-0100 X
    3. fw38b for Main Feedwater line break.
    4. rp08G for MFIV #1 failing to auto close
    5. rp09d for RC-606 and FP-601 B failing to auto close
    6. rx06d1 for MS-320 A
C. Verify the following Remotes:
    1. anr04h for EDG A local alarm acknowledgement.
    2. anr04i for EDG B local alarm acknowledgement.
D. Verify the following Overrides:
    1. di-18a4s27-1 for CVAS Fan A
    2. di-04a3a12c-3 for LWM-IFIC-0647
E. Verify the following under Event Actions:
    1. Trigger 2 assigned zdiwdlwmific0647(3).EQ.1.
    2. Trigger 8 assigned zdirxmsecs1692(1).EQ.1 performs dmf rx06d1.
F. Ensure Protected Train B sign is placed in SM office window.
G. Verify EOOS is 10.0 Green
H. Complete the simulator setup checklist.

Simulator Booth Instructions

Event 1 CVAS Fan A Fails to Start

1. If Work Week Manager or Electrical Maintenance is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.
2. If RAB Watch is sent to the breaker, report no abnormal indications.

Event 2 LWM-IFIC-0647 Fails High during WCT A Discharge

1. After RAB Normal Ventilation is running, call the Control Room and report that you are the RCA Watch and you are standing by to discharge Waste Condensate Tank A. You have completed step 6.10.6 and you are ready for step 6.10.7.
2. After the ATC initiates flow, if called, report that you heard flow, then you heard the isolation valves close. All other indications were normal.
3. If Work Week Manager or I&C is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.

Event 3 Containment pressure instrument CB-IPT-6701 SMC fails high

1. After the release is secured, or on Lead Examiner's cue, initiate Event Trigger 3.
2. If Work Week Manager or I&C is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.

Event 4 Pressurizer pressure instrument RC-IPR-0100 X fails low

1. After Tech Specs for Event 3 are addressed, or on Lead Examiner's cue, initiate Event Trigger 4.
2. If Work Week Manager or I&C is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.

Event 5 MS-320A Fails Open

1. After Pressurizer Pressure Channel Y is selected and on the Lead Examiner's cue, initiate Event Trigger 5.
2. If called as the watchstander and sent to MS-320A, report valve is stroking open.
3. If Work Week Manager or I&C is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.

Event 6 Main Feedwater Line Break in Containment

1. After MS-320A is closed or, if the CRS directs a reactor trip, during performance of SPTAs and on the Lead Examiner's cue, initiate Event Trigger 6.
2. If called as RAB watch to check EDG A & B, initiate Trigger 10, and when the EDG A & B Trouble alarms are clear, report that they are running satisfactorily.

Event 7 MFIV #1 Fails to Auto Close

1. If called to check MFIV #1 locally, report no visible problems locally.

Event 8 RC-606 and FP-601 B Fail to Auto Close

1. No communications should occur for this malfunction.

Scenario Timeline:

Event	Malfunction		Severity	Ramp HH:MM:SS	Delay	Trigger	Time (Min)
1	di-18a4s27-1		N/A	N/A	N/A	N/A	
	CVAS Fan A fails to start						
2	di-04A3a12c-3		N/A	N/A	N/A	2	
	LWM-IFIC-0647 Fails High during WCT A Discharge						
3	CH08	A1	N/A	N/A	N/A	3	
	Containment pressure instrument CB-IPT-6701 SMC fails high						
4	RX14	A	0%	N/A	N/A	4	
	Pressurizer pressure instrument RC-IPR-0100 X fails low						
5	RX06	D1	N/A	N/A	N/A	5	
	MS-320 A fails open						
6	FW38	B	50 %	00:01:00	N/A	6	
	Main Feedwater line break inside Containment						
7	RP08G		N/A	N/A	N/A	N/A	
	Main Feedwater Isolation Valve #1 fails to auto close on MSIS						
8	RP09D		N/A	N/A	N/A	N/A	
	RC-606 and FP-601 B fail to auto close on CIAS						

REFERENCES:

Event	Procedures
1	OP-903-052, Controlled Ventilation Area System Operability Check OP-002-010, Reactor Auxiliary Building HVAC and Containment Purge Tech Spec 3.7.7
2	OP-007-004, Liquid Waste Management
3	Tech Spec 3.3.1 and 3.3.2
4	Tech Spec 3.1.1.4
5	OP-901-120, Pressurizer Pressure Control Malfunction Tech Spec 3.2.8
6	OP-902-000, Standard Post Trip Actions OP-902-009, Standard Appendices, Appendix 1, Diagnostic Flow Chart OP-902-004, Excess Steam Demand Recovery
7	OP-902-000, Standard Post Trip Actions
8	OP-902-000, Standard Post Trip Actions

Op Test No.:	NRC	Scenario #	3	Event #	1	Page	1	of 16

Event Description: During performance of OP-903-052, CVAS Fan A will fail to start.

Time	Position	Applicant's Actions or Behavior
	CRS	Direct BOP to perform OP-903-052 and test CVAS Train A.
	Note	All control switches are located on CP-18.
	BOP	**CAUTION** Do not operate CVAS filter units for non-emergency purposes if welding, burning, painting, or chemical cleaning activities are being performed within the CVAS boundary or RAB +46 HVAC room. Ensure any painting or chemical cleaning is completely dry before running the CVAS unit.
	BOP	Verify Containment Pressure Control is secured in accordance with OP-008-002, Containment Atmosphere Release.
	BOP	Notify Radiation Protection that RAB Normal Ventilation will be secured for approximately 10 minutes.
	BOP	Notify Chemistry to suspend Fume Hood operation, prior to securing RAB Normal Ventilation (approximate duration of 10 minutes).
	BOP	Notify Security Department that RAB Normal Ventilation will be secured for approximately 10 minutes.
	BOP	**CAUTION** Do not secure RAB normal ventilation if containment pressure reduction is in progress, to prevent an unmonitored release from containment into the +46 HVAC room as well as the +46 HVAC penetration area.
	BOP	Make an announcement on the Plant Page stating "No welding, burning, chemical cleaning or painting in the RAB or RCA while running CVAS Train A.
	BOP	**WARNING** For personnel safety, the RAB Exhaust Fan, HVR0009 A(B), shall be secured if the RAB Supply Fan HVR0002 A(B), is secured.

Op Test No.: NRC Scenario # 3 Event # 1 Page 2 of 16

Event Description: During performance of OP-903-052, CVAS Fan A will fail to start.

Time	Position	Applicant's Actions or Behavior
	BOP	Secure the RAB Normal Supply Fan, HVR0002A.
	BOP	Secure the RAB Normal Exhaust Fan, HVR0009A.
	BOP	**NOTE** HVAC PIG B may give erroneous readings and alarms when CVAS filtration units are operating.
	BOP	Start Controlled Vent Area Exh Fan A, HVR0021A.
		• Controlled Vent Area Exh Fan A will not start when the control switch is taken to start.
	Note	If the CRS does not direct the BOP operator to re-start RAB Normal Ventilation, the booth operator will give this prompt from the shift manager.
	CRS	Upon notification of CVAS Fan A failure to start, evaluate Tech Specs.
		The CRS should enter Tech Spec 3.7.7, restore within 7 days.
	BOP	Start RAB Normal Exhaust Fan, HVR0009A.
	BOP	Verify the following on the operating fan: • HVR-122A (D52025) Open • HVR-121A (D52022) Not Closed
	BOP	Verify >69,000 scfm as indicated on PID S52432.

Op Test No.: NRC Scenario # 3 Event # 1 Page 3 of 16

Event Description: During performance of OP-903-052, CVAS Fan A will fail to start.

Time	Position	Applicant's Actions or Behavior
	BOP	**NOTE** Always start RAB Normal Supply Fan, HVR0002A(B), of same designation as operating Exhaust Fan, HVR0009A(B).
	BOP	Start RAB Normal Supply Fan, HVR0002A.
Examiner Note This event is complete after Tech Spec 3.7.7 has been addressed and RAB Normal Ventilation is running Or As directed by the Lead Evaluator		

Op Test No.: NRC	Scenario # 3	Event # 2	Page 4 of 16
Event Description:	Waste Condensate Tank A flow controller LWM-IFIC-0647 fails high		

Time	Position	Applicant's Actions or Behavior
	ATC	On CP-4, Reset Liquid Waste Discharge Flow Integrator to zero.
	ATC	Record WCT level and Liquid Waste Discharge Integrator reading on Liquid Release Permit.
	ATC	Verify Liquid Waste Discharge Flow Controller, LWM-IFIC-0647, in Manual with 0% output.
		CAUTION If Circulating Water flow is reduced to less than that required by the discharge permit, then discharge shall be secured immediately.
	ATC	Position Liquid Waste Condensate Flow Control handswitch, LWM-441 and LWM-442, to Open.
	ATC	Adjust flow using Liquid Waste Condensate Flow Controller, LWM-IFIC-0647, not to exceed value specified on Liquid Release Permit.
		Indications at execution of above step:
		• Discharge flow rate rises above 50 gpm after ATC releases the raise pushbutton.
		• Using the lower pushbutton does not lower flow.
	ATC	Position Liquid Waste Condensate Flow Control handswitch, LWM-441 and LWM-442, to close to stop release.
Examiner Note This event is complete when LWM-441 and LWM-442 are closed Or As directed by the Lead Evaluator		

Op Test No.: NRC	Scenario # 3	Event # 3	Page 5 of 16
Event Description:	Containment pressure instrument CB-IPT-6701-SMC fails high		

Time	Position	Applicant's Actions or Behavior
	ATC	Recognize and report indications of failed channel.
		Alarms:
		• RPS CHANNEL TRIP CNTMT PRESSURE HI (Cabinet K, A-17)
		• CNTMT PRESSURE HI PRETRIP A/C (Cabinet K, B-17)
		• ESFAS CHANNEL TRIP CNTMT PRESSURE HI (Cabinet K, L-17)
		• CNTMT PRESSURE HI ESFAS PRETRIP A/C (Cabinet K, M-17)
		• RPS CHANNEL C TROUBLE (Cabinet K, G-18)
		Indications
		• Containment pressure instrument CB-IPI-6701 SMC on CP-7 indicates pegged high.
	CRS	Review Tech Specs based on the failed instrument.
		• Enter Tech Spec 3.3.1 and 3.3.2.b
		• Direct bypassing Channel B bistables 13 and 16 for Hi Containment Pressure, RPS and ESFAS. This is a 1 hour action.
	Note	Crew may review OP-903-013, Monthly Channel Checks, to check for Tech Spec 3.3.3.5 and 3.3.3.6 applicability. Neither Tech Spec is applicable.
	BOP	Bypass Channel B bistables 13 and 16 for Hi Containment Pressure, RPS and ESFAS.
		• Located on CP-10 C (rear panel).

Examiner Note

This event is complete when Tech Specs 3.3.1 and 3.3.2 have been addressed

Or

As directed by the Lead Evaluator

Op Test No.: NRC Scenario # 3 Event # 4 Page 6 of 16

Event Description: Pressurizer pressure instrument RC-IPR-0100 X fails low

Time	Position	Applicant's Actions or Behavior
	ATC	Recognize and report indications of failed pressure instrument.
		Alarms
		• PRESSURIZER PRESSURE HI/LO (Cabinet H, E-1)
		• PRESSURIZER PRESS SIGNAL DEVIATION (Cabinet H, F-1)
		Indications
		• Recorder RC-IPR-0100 red pen fails lo.
		• Controller RC-IPIC-0100 process fails lo.
		• All Pressurizer Backup Heaters energize.
		• Pressurizer Proportional Heaters go to full fire at 200 amps.
	Note	Pressurizer pressure rises to 2270 psia at which time all Pressurizer Backup and Proportional Heaters de-energize. Pressurizer pressure begins to drop from 2270 psia.
	CRS	Enter and direct the implementation of OP-901-120, Pressurizer Pressure Malfunction, and use sub-section E1, Pressurizer Pressure Control Channel Instrument Failure.
	CRS	**CAUTION** Steam Generator pressures dropping concurrently with dropping Pressurizer level may be indicative of an excess steam demand.
	CRS	IF Pressurizer Pressure and Level are dropping concurrently, OR RCS leakage is otherwise indicated, THEN GO TO OP-901-111, Reactor Coolant System Leak.
	CRS	IF PRESSURIZER PRESSURE CHANNEL X/Y recorder (RC-IPR-0100) indicates a Pressurizer Pressure Control Channel instrument has failed, THEN GO TO Subsection E1, Pressurizer Pressure Control Channel Instrument Failure.
	ATC	Verify control channel instrument failure by checking PRESSURIZER PRESSURE CHANNEL X/Y recorder (RC-IPR-0100).

Op Test No.:	NRC	Scenario #	3	Event #	4	Page	7	of 16

Event Description: Pressurizer pressure instrument RC-IPR-0100 X fails low

Time	Position	Applicant's Actions or Behavior
	ATC	Transfer Pressurizer pressure control to operable channel (Y) using Pressurizer Pressure Channel Selector control switch.
	CRS	IF Pressurizer Pressure control channel is failed high, THEN perform the following: • Transfer Pressurizer Lo Level Heater Cutout selector switch to the Operable Pressurizer Pressure control channel. • Reset Proportional Heater Banks #1 & #2.
		Not applicable
	CRS	Verify proper operation of Pressurizer Pressure controller (RC-IPIC-0100) AND Pressurizer Pressure controlling OR being restored to 2250 PSIA.
	CRS	Refer to Technical Specification 3.2.8.
		• Entry required if RCS pressure exceeded 2275 PSIA
		• Pressure should not exceed 2270 PSIA.
Examiner Note This event is complete when Pressurizer pressure control has been transferred to Y. Or As directed by the Lead Evaluator.		

Op Test No.: NRC Scenario # 3 Event # 5 Page 8 of 16

Event Description: Steam Bypass Valve MS-320A fails open

Time	Position	Applicant's Actions or Behavior
	ATC / BOP	Recognize and report indications of RCS cooldown.
		Indications
		• MS-319A modulates closed.
		• Lowering RCS Cold Leg temperature.
		• Rising Reactor power.
		• Permissives for Steam Bypass Control System clear.
		• As the RCS cools, Letdown flow goes to minimum and Charging Pump A and AB start.
		There are 2 acceptable paths that the CRS may take on this malfunction. One option would be to direct a Reactor trip based on power rising and the RCS cooldown. Another option would be to close MS-320A. Steps are included for either option.
	BOP	If directed by CRS, attempt to close MS-320A.
		• If attempted, controller MS-IHIC-320A will **not** close MS-320A
		• If attempted, MS-320A control switch will close MS-320A if placed in OFF.
	Note	• MS-320A controls are located on CP-1.
	ATC	If directed by CRS, trip Reactor using 2 Reactor Trip pushbuttons at CP-2.
	CRS	Direct ATC and BOP to carry out Standard Post trip Actions.
	Note	Steps for Standard post trip actions are listed under the next event and not repeated here. If the crew trips the reactor at this point, then go to page 10.
		If the cause of RCS cooldown is not discovered and addressed, the CRS may direct initiation of MSIS and Emergency Boration.
	ATC/BOP	Initiate MSIS using 2 pushbuttons on either CP-7 or CP-8.

Op Test No.:	NRC	Scenario #	3	Event #	5	Page	9	of 16

Event Description: Steam Bypass Valve MS-320A fails open

Time	Position	Applicant's Actions or Behavior
	ATC	If directed to perform Emergency Boration:
		• Place Makeup Mode selector switch to MANUAL.
		• Align borated water source by performing one of the following:
		o Initiate Emergency Boration using Boric Acid Pump as follows:
		o Open Emergency Boration Valve, BAM-133.
		o Start one Boric Acid Pump.
		o Close recirc valve for Boric Acid Pump started:
		▪ BAM-126A Boric Acid Makeup Pump Recirc Valve A
		▪ BAM-126B Boric Acid Makeup Pump Recirc Valve B
		• **OR**
		o Initiate Emergency Boration using Gravity Feed as follows:
		o Open the following Boric Acid Makeup Gravity Feed valves:
		o BAM-113A Boric Acid Makeup Gravity Feed Valve A
		o BAM-113B Boric Acid Makeup Gravity Feed Valve B
		• Close VCT Disch Valve, CVC-183.
		• Verify at least one Charging Pump operating and Charging Header flow 40 GPM.
Examiner Note This event is complete when MS-320A is closed Or The Reactor has been tripped with MSIS initiated Or As directed by the Lead Evaluator.		

Op Test No.:	NRC	Scenario #	3	Event #	6 / 7 / 8	Page	10	of 16

Event Description: Main Feedwater line break in Containment, FW-184 A fails to auto close, RC-606 and FP-601 B fail to auto close.

Time	Position	Applicant's Actions or Behavior
	ATC / BOP	Recognize and report indications.
		Alarms
		• Containment Water Leakage Hi (Cabinet N, L-20)
		• Containment Water Leakage Hi-Hi (Cabinet N, K-20)
		• Containment Pressure Hi/Lo (Cabinet M, H-4 and N, H-14)
		• Containment Fan Cooler B Disch Air Temp Hi (Cabinet SB, B-6)
		• Containment Fan Cooler D Disch Air Temp Hi (Cabinet SB, C-6)
		Indications
		• Rising Containment Pressure
		• Lowering level Steam Generator #2
	Note	The following steps are applicable after the reactor is tripped and the crew is performing Standard Post Trip Actions.
	ATC	Determine **Reactivity Control** acceptance criteria are met: • Check reactor power is dropping. • Check startup rate is negative. • Check less than **TWO** CEAs are **NOT** fully inserted.
	BOP	Determine **Maintenance of Vital Auxiliaries** acceptance criteria are met: Check the Main Turbine is tripped: • Governor valves closed • Throttle valves closed
	BOP	Check the Main Generator is tripped: • GENERATOR BREAKER A tripped • GENERATOR BREAKER B tripped • EXCITER FIELD BREAKER tripped

Op Test No.:	NRC	Scenario #	3	Event #	6 / 7 / 8	Page	11	of 16

Event Description: Main Feedwater line break in Containment, FW-184 A fails to auto close, RC-606 and FP-601 B fail to auto close.

Time	Position	Applicant's Actions or Behavior
	BOP	Check station loads are energized from offsite electrical power as follows: **Train A** • A1, 6.9 KV non safety bus • A2, 4.16 KV non safety bus • A3, 4.16 KV safety bus • A-DC electrical bus • A or C vital AC Instrument Channel **Train B** • B1, 6.9 KV non safety bus • B2, 4.16 KV non safety bus • B3, 4.16 KV safety bus • B-DC electrical bus B or D vital AC Instrument Channel
	ATC	Determine RCS Inventory Control acceptance criteria are met: Check that the following conditions exist: • Pressurizer level is 7% to 60% • Pressurizer level is trending to 33% to 60% • Check RCS subcooling is greater than or equal to 28ºF.
	Note	This safety function may or may not be met, depending on the speed the crew is working Standard Post Trip Actions. Either way, there are no contingencies necessary for this step.
	ATC	Determine RCS Pressure Control acceptance criteria are met by checking that BOTH of the following conditions exist: • Pressurizer pressure is 1750 psia to 2300 psia • Pressurizer pressure is trending to 2125 psia to 2275 psia

Op Test No.:	NRC	Scenario #	3	Event #	6 / 7 / 8	Page	12	of 16

Event Description: Main Feedwater line break in Containment, FW-184 A fails to auto close, RC-606 and FP-601 B fail to auto close.

Time	Position	Applicant's Actions or Behavior
	CRS	IF pressurizer pressure is less than 1684 psia, THEN verify the following have initiated. • SIAS • CIAS
	ATC	If directed by CRS, initiate Safety Injection Actuation (SIAS), Main Steam Isolation (MSIS) and Containment Isolation Actuation (CIAS) at CP-7.
	ATC	Close RC-606 at CP-4
	Note	This valve malfunctions and fails to auto close. It will close when the control switch is taken to close.
	BOP	Close FP-601 B at CP-8
	Note	This valve malfunctions and fails to auto close. It will close when the control switch is taken to close.
	ATC	**IF** pressurizer pressure is less than 1621 psia, **THEN** verify no more than two RCPs are operating
	ATC	Determine Core Heat Removal acceptance criteria are met: • Check at least one RCP is operating. • Check operating loop ΔT is less than 13ºF. • Check RCS subcooling is greater than or equal to 28ºF.
	Note	Depending on the speed the crew is working, the ATC may have already secured all RCPs due to Containment Spray initiation. If all RCPs are OFF, then the CRS is permitted to skip this step.
	BOP	Determine RCS Heat Removal acceptance criteria are met: Check that at least one steam generator has BOTH of the following: • Steam generator level is 5% to 80% NR • Main Feedwater is available to restore level within 50%-70% NR.
	Note	The contingency for this step, since there will be a Main Steam Isolation Signal, is to verify Emergency Feedwater is available. This does not require a manual initiation of EFAS.

Op Test No.: NRC Scenario # 3 Event # 6 / 7 / 8 Page 13 of 16

Event Description: Main Feedwater line break in Containment, FW-184 A fails to auto close, RC-606 and FP-601 B fail to auto close.

Time	Position	Applicant's Actions or Behavior
	ATC	Check RCS TC is 530 ºF to 550 ºF
	CRS	**IF** RCS TC is less than 530 ºF, **THEN** perform the following: **IF** RCS TC is being controlled by an ESD, **THEN** REFER TO Appendix 13, "Stabilize RCS Temperature" and stabilize RCS temperature using the least affected steam generator.
	Note	Appendix 13 directs steps to address PTS after Representative CET temperature and Pressurizer pressure have both started to rise. The steps are also contained in the excess steam demand recovery procedure. Given the break is on the Feedwater line and the low power the event started in, the crew should transition to OP-902-004 prior to reaching that trigger.
	BOP	Check steam generator pressure is 885 psia to 1040 psia.
	BOP	**IF** steam generator pressure is less than 885 psia, **THEN** perform **ALL** of the following: 1) Verify steam bypass valves are closed. 2) Verify ADVs are closed. **IF** steam generator pressure is less than or equal to 666 psia, **THEN** verify MSIS is initiated.
Critical Task Establish Containment Isolation This task is satisfied by taking action to close FW-184 A prior to completing the crew review of Standard Post Trip Actions.		
	BOP	Close FW-184 A, MFIV #1 at CP-8.

Op Test No.:	NRC	Scenario #	3	Event #	6 / 7 / 8	Page	14	of 16

Event Description: Main Feedwater line break in Containment, FW-184 A fails to auto close, RC-606 and FP-601 B fail to auto close.

Time	Position	Applicant's Actions or Behavior
	BOP	Check Feedwater Control in Reactor Trip Override: • MAIN FW REG valves are closed • STARTUP FW REG valves are 13% to 21% open • Operating main Feedwater pumps are 3800 rpm to 4000 rpm
	Note	With a MSIS, MAIN FW REG valves and STARTUP FW REG valves will be closed.
	BOP	Reset moisture separator reheaters, and check the temperature control valves closed.
	ATC	Determine Containment Isolation acceptance criteria are met: • Check containment pressure is less than 16.4 psia. • Check NO containment area radiation monitor alarms OR unexplained rise in activity. • Check NO steam plant activity monitor alarms OR unexplained rise in activity.
		IF containment pressure is greater than or equal to 17.1 psia, THEN verify the following: • CIAS is initiated • SIAS is initiated • MSIS is initiated
	BOP	Determine Containment Temperature and Pressure Control acceptance criteria are met: • Check containment temperature is less than or equal to 120ºF. • Check containment pressure is less than 16.4 psia.
		IF containment pressure is greater than or equal to 17.7 psia, THEN verify ALL of the following: • CSAS is initiated • ALL available containment spray pumps are delivering flow greater than 1750 gpm • ALL RCPs are secured

Op Test No.:	NRC	Scenario #	3	Event #	6 / 7 / 8	Page	15	of 16

Event Description: Main Feedwater line break in Containment, FW-184 A fails to auto close, RC-606 and FP-601 B fail to auto close.

Time	Position	Applicant's Actions or Behavior
Critical Task Trip any RCP not satisfying RCP operating limits. This task is satisfied by securing all RCPs within 3 minutes of CSAS initiation.		
	ATC	Following initiation of CSAS secure all running Reactor Coolant Pumps as follows: • Place each RCP control switch to stop at CP-2
	BOP	Secure AH-12 A or B on CRS direction after initiation of SIAS at CP-18.
	CRS	After review of Standard Post Trip Actions, use Diagnostic Flow Chart of OP-902-009 to select appropriate optimal recovery procedure. • Proper use of chart will result in use of OP-902-004, Excess Steam Demand Recovery
	CRS	After Excess Steam Demand is identified, direct ATC and BOP to monitor for the trigger points for the need to stabilize RCS temperature. Critical parameters are Pressurizer pressure rising and RCS Representative CET temperature rising. Steps for stabilizing RCS temperature following an excess steam demand are contained in 2 procedures. • Appendix 13 is used if the critical parameters are both rising before the CRS has entered OP-902-004, Excess Steam Demand Recovery. • Step 16 of OP-902-004 is used if both parameters start rising after the crew has entered OP-902-004.

Op Test No.:	NRC	Scenario #	3	Event #	6 / 7 / 8	Page	16	of	16

Event Description: Main Feedwater line break in Containment, FW-184 A fails to auto close, RC-606 and FP-601 B fail to auto close.

Time	Position	Applicant's Actions or Behavior
		Critical Task Establish RCS temperature control This task is satisfied by taking action to stabilize RCS temperature within the limits of the RCS P/T curve using ADV #1 and establishing EFW flow to Steam Generator #1. Action to address this task should commence within 10 minutes after the applicable parameters begin to rise.
	BOP	When directed by the CRS to take action to stabilize RCS temperature:
		• Place the ADV for Steam Generator #1 to manual and fully open the ADV #1.
		• Manually initiate EFAS for Steam Generator #1.
		• Place EFW Flow Control Valve to manual and commence feeding Steam Generator #1.
		Critical Task Establish RCS pressure control This task is satisfied by taking action to stabilize RCS pressure within the limits of the RCS P/T curve and additionally maintain RCS pressure within 1500-1600 psid of the faulted steam generator. Action to address this task should commence prior to exceeding 1600 psid between Steam Generator 2 and the RCS.
	ATC	When directed by the CRS to take action to stabilize RCS temperature:
		• **IF** RCS pressure is ≥ 1500 psia, **THEN** stabilize RCS pressure at a value not to exceed 1600 psid between the RCS and the lowest SG pressure.
		• **IF** RCS pressure is < 1500 psia, **THEN** stabilize RCS pressure at > HPSI shutoff head (1500-1600 psia).
		Examiner Note This event is complete after RCS temperature and pressure have been stabilized Or As directed by the Lead Evaluator.

Facility: WATERFORD 3 Scenario No.: 4 Op Test No.: **NRC**

Examiners: _____ Operators: _____

Initial Conditions:
- 37% Power on RCS chemistry hold
- Main Feedwater Pump B is running

Turnover:
- Hold power until directed by plant management
- Start ACCW Pump A for chemical mixing

Event No.	Malf. No.	Event Type*	Event Description
1	CC02A	C – BOP C – SRO TS - SRO	Start Auxiliary Component Cooling Water Pump A for chemical mixing. ACCW Pump A will trip following start.
2	SG11C	I – BOP TS - SRO	Steam Generator Level #2 level instrument SG-ILT1123 C fails low
3	CV05B2	C – ATC C - SRO	Letdown Backpressure Control Valve CVC-123B, fails closed
4		R – ATC N – BOP N – SRO	Direction given to raise power to < 50% using OP-010-004, Power Operations.
5	RP04A3, RP04B3 DI-08A03s14-1 DI-08A03s07-1	I – BOP I - SRO	Inadvertent Containment Spray Actuation Signal, secure Containment Spray Pumps
6		M – All	Manual Reactor trip
7	DI-08A07S26-1	I – ATC I - SRO	CC-641 will fail to reopen, Secure all Reactor Coolant Pumps on loss of Component Cooling Water flow
8	SG01A	M – All	Steam Generator #1 tube rupture ramps in over 3 minute period following reactor trip
8		C – BOP C – SRO	Isolate Steam Generator #1 when < 520 °F hot leg temperature
8		C – ATC C – SRO	Reduce RCS pressure using Auxiliary Spray while maintaining sub-cooled margin.

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

The crew assumes the shift at 37% power with instructions to maintain power.

The crew is directed to start Auxiliary Component Cooling Water Pump A for basin chemical mixing. After the start, ACCW Pump A will trip. The SRO should declare ACCW Pump A inoperable and enter a 72 hour action for Tech Spec 3.7.3 as well as cascading Tech Specs. The SRO should address the need to accomplish surveillance OP-903-066, Electrical Breaker Alignment Checks, within 1 hour to comply with Tech Spec 3.8.1.1.b. They must also address the need to accomplish the requirements of Tech Spec 3.8.1.1.d within 2 hours.

After Tech Specs have been addressed, Steam Generator #2 Level instrument SG-ILT-1123 C fails low. The SRO should enter Tech Spec 3.3.1 and 3.3.2. PPS bistables for Channel C Steam Generator Level Low, Steam Generator Level High, and Steam Generator Differential Pressure for Steam Generator #2 should be placed in bypass within 1 hour.

After the appropriate bistables have been bypassed, CVC-123B, Chemical and Volume Control Backpressure Control Valve B will fail closed. Letdown flow will go to 0 gpm. The SRO should enter OP-901-112, Charging or Letdown Malfunction, and transition to sub-section E2, Letdown Malfunction. The ATC operator should place the standby Letdown Backpressure Control Valve in service and restore Letdown flow.

After Letdown has been restored, the SRO will be given direction to raise power to 50% for placing Main Feedwater Pump A in service. The SRO should use OP-010-004, Power Operations to direct the power ascension. The ATC operator will add Primary Makeup Water to the Volume Control Tank and the BOP operator will raise Main Turbine load.

At the direction of the lead examiner, an inadvertent Containment Spray Actuation Signal will be generated. The SRO should enter OP-901-504, Inadvertent ESFAS Actuation. The BOP should be directed to secure Containment Spray Pumps A and B. The BOP operator will be directed to restore CCW flow to the Reactor Coolant Pumps. CC-641, RCP Inlet Outside Isolation will fail to reopen when attempted by the BOP operator. The SRO should direct the ATC to trip the reactor and secure Reactor Coolant Pumps.

A Steam Generator tube rupture ramps in for Steam Generator #1 during the Containment Spray actions. The crew should diagnose into OP-902-007, Steam Generator Tube Rupture Recovery. The SRO will direct a rapid RCS cooldown to < 520 °F hot leg temperature. Following the rapid cooldown, the BOP should be directed to isolate Steam Generator #1 and the ATC operator should be directed to lower RCS pressure using Auxiliary Spray within the RCS temperature and pressure limits.

The scenario can be terminated after Steam Generator #1 is isolated and the crew has taken action to reduce RCS pressure.

Critical Tasks

1. Trip any RCP not satisfying RCP operating limits.

   This task is satisfied by securing all RCPs within 3 minutes of CSAS initiation.

2. Prevent opening the Main Steam Safety valves on Steam Generator #1

   This task is satisfied by taking action lower RCS pressure to < 945 PSIA.

3. Isolate Steam Generator #1

   This task is satisfied by isolating Steam Generator #1 in accordance with step 17 after RCS T_{HOT} is reduced below 520 °F.

Scenario Notes:

A. Reset Simulator to IC-94.
B. Verify the following Scenario Malfunctions:
    1. cc02a for ACCW Pump A
    2. sg11c for SG-ILT-1123 C failing low
    3. cv05b2 for CVC-123 B failing closed
    4. sg01a for Steam Generator #1 tube rupture
C. Verify the following Remotes:
    1. cvr03 for CVC-121 A manipulations
    2. cvr04 for CVC-121 B manipulations
D. Verify the following overrides
    1. di-08a07s26-1 for CC-641 failing closed
E. Ensure Protected Train B sign is placed in SM office window.
F. Verify EOOS is 10.0 Green
G. Complete the simulator setup checklist.

Simulator Booth Instructions

Event 1 ACCW Pump A Trip

1. On Lead Examiner's cue, initiate Event Trigger 1.
2. If Work Week Manager, PME or I&C is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.
3. If called as the RCA Watch prior to ACCW Pump A start, report when requested:
    - ACC Pump A(B) Recirc Line Isolation, ACC-107A is locked open
    - ACCW Pump A(B) bearing oil level is between the OFF level marks
    - A visible clearance exists between piping and jack stand.
4. If called as the RCA watch on pump start, report ACCW Pump A looks good when started.
5. If called as RCA watch after pump trip, report no abnormal indications locally.
6. If called as the RAB Watch to check the breaker for ACCW Pump A, report no trip flags are picked up, but there are breaker parts on the bottom of the breaker cubicle.

Event 2 SG-ILT-1123 C fails low

1. On Lead Examiner's cue, initiate Event Trigger 2.
2. If Work Week Manager or I&C is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.

Event 3 CVC-123 B fails closed

1. On Lead Examiner's cue, initiate Event Trigger 3.
2. If Work Week Manager or PMM is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.
3. If called as the RCA watch, report standing by on the -4 for valve manipulations.
4. If called regarding CVC-123 B, report signs of air leaking behind shield wall, but will have to investigate further.
5. Event Trigger 16 will perform the field operations for CVC-121 A.
6. Event Trigger 17 will perform the field operations for CVC-121 B.

Event 4 Power Ascension to 50%

1. On the Lead Examiner's cue, call the CRS and direct him to begin raising power to 50%.
2. If called as TGB watch to monitor Condensate Polishers, report standing by on station.

Event 5 Inadvertent CSAS

1. On the Lead Examiner's cue, initiate Event Trigger 5.
2. If Work Week Manager or PMM is called, inform the caller that a work package will be assembled and a team will be sent to the Control Room.

Event 6 Manual Reactor Trip

1. No communications should occur for this event.

Event 7 CC-641 fails to reopen, secure Reactor Coolant Pump on loss of CCW

1. If called as RCP system engineer, respond that you will check out the RCP parameters and get back with you.
2. If called as RCA watch to check CC-641, report no abnormal indications.

Event 8 SGTR on Steam Generator #1

1. If called as the shift chemist to carry out the actions of UNT-005-032, simply confirm request; no additional report is necessary.
2. If called as the OSW to check Steam Generator #1 safety valves, report safety valves are not lifting.

Scenario Timeline:

Event	Malfunction	Severity	Ramp HH:MM:SS	Delay	Trigger	Time (Min)
1	CC02A ACCW Pump A trip	N/A	N/A	N/A	1	
2	SG11C SG-ILT-1123 C fails to 0%	0%	N/A	N/A	2	
3	CV05B2 CVC-123 B fails closed	N/A	N/A	N/A	3	
5	RP04A3 RP04B3 DI-08A03S14-1 DI-08A03S07-1 Inadvertent CSAS	N/A	N/A	N/A	5	
7	DI-08A07s26-1 CC-641 fails to reopen	N/A	N/A	N/A	5	
8	SG01A Steam Generator #1 Tube Rupture (ramps in during CSAS event)	4.0	3:00	2:00	5	

REFERENCES:

Event	Procedures
1	OP-002-001, Auxiliary Component Cooling Water OP-100-014, Technical Specification and Technical Requirements Compliance Tech Spec 3.7.3 and 3.8.1.1
2	OP-903-013, Monthly Channel Checks Tech Spec 3.3.1 and 3.3.2
3	OP-901-112, Charging or Letdown Malfunction
4	OP-010-004, Power Operations OP-002-005, Chemical and Volume Control
5	OP-901-504, Inadvertent ESFAS Actuation OP-902-000, Standard Post Trip Actions OP-902-009, Standard Appendices, Appendix 1, Diagnostic Flow Chart
6	OP-901-504, Inadvertent ESFAS Actuation OP-902-000, Standard Post Trip Actions
7	OP-901-504, Inadvertent ESFAS Actuation
8	OP-902-007, Steam Generator Tube Rupture Recovery

Op Test No.:	NRC	Scenario #	4	Event #	1	Page	1	of 21

Event Description: Start Auxiliary Component Cooling Water Pump A for chemical mixing. ACCW Pump A Trips

Time	Position	Applicant's Actions or Behavior
	Note	All manipulations for this event are located on CP-33
	BOP	6.2.1 Verify system has been filled and vented, in accordance with Section 5.1, Fill and Vent.
	BOP	6.2.2 Prior to starting the selected ACC Pump, verify a visible clearance exists between piping and jack stand.
	BOP	6.2.3 Verify following ACC Wet Cooling Tower Fan groups are in Auto: • ACC Wet Cooling Tower A Fans 1A through 4A • ACC Wet Cooling Tower A Fans 5A through 8A
	BOP	6.2.4 Verify ACC Pump A Discharge Line Isolation, ACC-110A, in AUTO.
	BOP	6.2.5 Verify Locked Open ACC Pump A Recirc Line Isolation, ACC-107A.
	BOP	6.2.6 Close ACC Header A CCW HX Outlet Temp Control Valve, ACC-126A, using Component Cooling Water Header A Temperature Indicating Controller, CC-ITIC-7070A, in Manual.
	BOP	6.2.7 Verify ACCW Pump A bearing oil level is between the OFF level marks.
	BOP	Procedure caution (1) Reactivity should be monitored for changes, when changing CCW temperature causes Letdown temperature changes. Lowering Letdown temperature may remove boron from ion exchanger effluent and raising Letdown temperature may release boron into ion exchanger effluent. (2) Changing CCW temperature will cause changes in Containment pressure. Lowering Containment pressure will cause indicated Containment Spray riser level to lower.

Op Test No.:	NRC	Scenario #	4	Event #	1	Page	2	of 21

Event Description: Start Auxiliary Component Cooling Water Pump A for chemical mixing. ACCW Pump A Trips

Time	Position	Applicant's Actions or Behavior
	BOP	6.2.8 Start ACC Pump A.
	BOP	6.2.9 Verify ACC Jockey Pump A Stops.
	BOP	Procedure caution It may be necessary to throttle cooling water to ACC pump oil cooler if thrust bearing temperature is less than 70°F after 15 minutes of operation.
	BOP	6.2.10 Verify Open ACC Pump A Discharge Line Isolation, ACC-110A.
	BOP	6.2.11 Verify ACCW Pump A bearing oil level is between the RUN mark and the HIGH mark and flow exists through the sightglass.
	BOP	Procedure note Recommend ≥ 1000 gpm flow through ACC-126A(B) to minimize pump vibration.
	BOP	6.2.12 Restore Component Cooling Water Header A Temperature Indicating Controller, CC-ITIC-7070A, setpoint to ≤ 95°F or as otherwise directed by the SM/CRS.
	BOP	6.2.13 Verify Component Cooling Water Header A Temperature Indicating Controller, CC-ITIC-7070A, is in AUTO.

Op Test No.:	NRC	Scenario #	4	Event #	1	Page	3	of 21

Event Description: Start Auxiliary Component Cooling Water Pump A for chemical mixing. ACCW Pump A Trips

Time	Position	Applicant's Actions or Behavior
	BOP	Recognize and report indications of tripped ACCW Pump A.
		Alarms:
		• Aux CCW Pump A Trip Trouble (Cabinet B, H-9)
		Indications
		• Amber light on control switch for ACCW Pump A
		• ACCW Flow goes to 0 gpm
	CRS	Upon notification of ACCW Pump A trip, evaluate Tech Specs.
		• Correct Tech Spec is 3.7.3 and cascading Tech Specs. OP-903-066, Electrical Breaker Alignment Check, is required within 1 hour. verification of Tech Spec 3.8.1.1.d within 2 hours.
Examiner Note This event is complete after Tech Spec 3.7.3 and cascading Tech Specs have been addressed Or As directed by the Lead Evaluator		

Op Test No.: NRC Scenario # 4 Event # 2 Page 4 of 21

Event Description: Steam Generator Level #2 level instrument SG-ILT1123 C fails low

Time	Position	Applicant's Actions or Behavior
	ATC	Recognize and report indications of failed channel.
		Alarms:
		• RPS Channel Trip SG 2 Level Lo (Cabinet K, E-14)
		• SG 2 Level Lo Pretrip A/C (Cabinet K, F-14)
		• RPS Channel C Trouble (Cabinet K, G-18)
		Indications
		• SG-ILI-1123 C indicates 0% narrow Range on CP-8
		• LO SG-2 Level trip and pre-trip on Channel C
	CRS	Review Tech Specs based on the failed instrument.
		• Enter Tech Spec 3.3.1 and 3.3.2.b.
		• Direct bypassing Channel C bistables 8, 10, and 20 for Steam Generator Level Low, Steam Generator Level High, and Steam Generator Differential Pressure for Steam Generator #2. This is a 1 hour action.
	BOP	Bypass Channel C bistables 8, 10, and 20 for Steam Generator Level Low, Steam Generator Level High, and Steam Generator Differential Pressure for Steam Generator #2.
		• Located on CP-10 C (rear panel).
Examiner Note This event is complete when the proper bistables have been bypassed Or As directed by the Lead Evaluator		

Op Test No.: NRC	Scenario # 4	Event # 3	Page 5 of 21
Event Description:	Letdown Backpressure Control Valve CVC-123B, fails closed		

Time	Position	Applicant's Actions or Behavior
	ATC	Recognize and report indications of failed Backpressure Control Valve.
		Alarms
		• Letdown Flow Hi/Lo (Cabinet G, C-1)
		• Letdown HX Outlet Pressure Hi (Cabinet G, A-2)
		Indications
		• Letdown Backpressure Regulating valve not controlling at setpoint.
		• Letdown flow 0 gpm
	CRS	Enter and direct the implementation of OP-901-112, Charging or Letdown Malfunction.
	CRS	Stop turbine load changes.
	CRS	IF a Letdown Malfunction is indicated, THEN go to Subsection E2, Letdown Malfunction.
	CRS	IF necessary, THEN maintain Pressurizer level by placing LETDOWN FLOW CONTROL VALVES controller (RC-IHIC-0110) in MAN, and control manually.
	CRS	Procedure note If all Charging Pumps are secured, then LETDOWN STOP VALVE (CVC 101) will close on high REGEN HX TUBE OUTLET temperature if RCS is ≥470°F.
	CRS	Operate Charging Pumps as necessary to maintain Pressurizer level in accordance with Attachment 1, Pressurizer Level Versus Tave Curve.
	Note	With current plant conditions of RCS T_{AVE} approximately 555 F, the minimum Pressurizer level allowed for continued operation is 25%. The Pressurizer level limits of Tech Spec 3.4.3.1.a are 26% low and 62.5 % high.
	Note	If Charging Pump A or B is placed in OFF, then the CRS should enter Tech Spec and TRM 3.1.2.4.
	Note	All manipulations for this event will be at CP-4.
	ATC	Secure necessary Charging Pumps by placing the control switch to STOP.

Op Test No.: NRC	Scenario # 4	Event # 3	Page 6 of 21
Event Description:	Letdown Backpressure Control Valve CVC-123B, fails closed		

Time	Position	Applicant's Actions or Behavior
	CRS	IF Pressurizer level falls below the minimum level for operation of Attachment 1, THEN perform the following: Trip the Reactor. Manually initiate Safety Injection Actuation. Go to OP-902-000, STANDARD POST TRIP ACTIONS.
	CRS	IF a leak exists in Letdown System, THEN attempt to locate AND isolate leak.
	CRS	IF the in service Letdown Flow Control valve (CVC 113A) OR (CVC 113B) is NOT controlling, THEN place standby Letdown Flow Control valve in service as follows:
	CRS	IF Letdown Backpressure Controller (CVC-IPIC-0201) is NOT operating properly, THEN perform the following: Control Letdown flow with Letdown Flow Controller (RC-IHIC-0110) in MAN. Control Letdown backpressure with Letdown Backpressure Controller (CVC-IPIC-0201) in MAN.
	Note	There is no malfunction on the backpressure controller. CVC-IPIC-0201 will have a maximum output with the in service backpressure control valve closed.
	ATC	IF the in service Letdown Backpressure Control valve (CVC 123A) OR (CVC 123B) is NOT operating properly, THEN place standby Letdown Backpressure Control valve in service as follows: Place Letdown Backpressure Controller (CVC-IPIC-0201) in MAN AND make necessary adjustments to maintain pressure during transfer.
	ATC	Place Letdown Backpressure Control Valve Selector switch to BOTH.
	ATC	Verify open standby Letdown Back PCV A Outlet Isolation (CVC 125A).
	ATC	Slowly open standby Letdown Backpressure Control Valve Inlet Isolation (CVC 121A).
	ATC	Slowly close in service Letdown Backpressure Control Valve Inlet Isolation (CVC 121B).

Op Test No.:	NRC	Scenario #	4	Event #	3	Page	7	of 21

Event Description: Letdown Backpressure Control Valve CVC-123B, fails closed

Time	Position	Applicant's Actions or Behavior
	ATC	Close in service Letdown Back PCV B Outlet Isolation (CVC 125B).
	ATC	Position Letdown Backpressure Control Valve Selector switch to select operable Backpressure Control valve placed in service.
	ATC	IF letdown is still in service and Letdown Backpressure Control valve operates properly, THEN place Letdown Backpressure Controller (CVC-IPIC-0201), in Auto by performing the following: • Adjust setpoint to ≤460 PSIG. • Verify Process is within 3% of setpoint. • Place controller in AUTO.
	ATC/CRS	Locally monitor the following differential pressure indications: Purification Ion Exchanger A DP (CVC-IDPI-0207) Purification Ion Exchanger B DP (CVC-IDPI-0205) Deborating Ion Exchanger DP (CVC-IDPI-0203) Purification Filter DP (CVC-IDPI-0202) Letdown Strainer DP (CVC-IDPI-0204)
	ATC	IF the LETDOWN FLOW CONTROL VALVES controller (RC-IHIC-0110) has been placed in manual to control Pressurizer level, THEN match controller process with its output and place in AUTO.
Examiner Note This event is complete when CVC-123 A has been placed in service Or As directed by the Lead Evaluator		

Op Test No.: NRC	Scenario # 4	Event # 4	Page 8 of 21
Event Description:	Direction given to raise power to < 50% using OP-010-004, Power Operations.		

Time	Position	Applicant's Actions or Behavior
	CRS	Receives direction to raise power to 45-50%.
	ATC	Procedure caution This section affects reactivity. This evolution should be crosschecked and completed prior to leaving CP-4.
	ATC	Inform SM/CRS that this Section is being performed.
	ATC	Procedure note When performing a Plant down power where final RCS Boron Concentration needs to be determined, the following Plant Data Book figure(s) will assist the Operator in determining the required RCS Boron PPM change. 1.2.1.1 Power Defect Vs Power Level 1.4.3.1 Inverse Boron Worth Vs. Tmod at BOC (<30 EFPD) 1.4.4.1 Inverse Boron Worth Vs. Tmod at Peak Boron (30 EFPD up to 170 EFPD) 1.4.5.1 Inverse Boron Worth Vs. Tmod at MOC (170 EFPD up to 340 EFPD) 1.4.6.1 Inverse Boron Worth Vs. Tmod at EOC (≥ 340 EFPD)
	ATC	At SM/CRS discretion, calculate volume of Primary Makeup water to be added on Attachment 11.7, Calculation of Primary Makeup Water Volume for Direct Dilution or VCT Dilute Makeup Mode.
	ATC	Set Primary Makeup Water Batch Counter to volume of Primary Makeup water desired.
	ATC	Place Makeup Mode selector switch to DILUTE.
	ATC	Open VCT Makeup Valve, CVC-510.
	ATC	Procedure note The Dilution Flow Totalizer will not register below 5 GPM. The Dilution Flow Totalizer is most accurate at > 10 GPM.

Op Test No.: NRC	Scenario # 4	Event # 4	Page 9 of 21
Event Description:	Direction given to raise power to < 50% using OP-010-004, Power Operations.		

Time	Position	Applicant's Actions or Behavior
	ATC	Procedure caution Dilution shall immediately be stopped if Pre-power Dependent Insertion Limit (H-9, cabinet H) alarm is initiated or any unexpected reactivity change occurs.
	ATC	If manual control of Primary Makeup Water flow is desired, then perform the following:
	ATC	Verify Primary Makeup Water Flow controller, PMU-IFIC-0210X, in Manual.
	ATC	Adjust Primary Makeup Water Flow controller, PMU-IFIC-0210X, output to > 5 GPM flow rate.
	ATC	Verify Primary Makeup Water Control Valve, PMU-144, Intermediate or Open.
	ATC	Observe Primary Makeup water flow rate for proper indication.
	ATC	Operate VCT Inlet/Bypass to Holdup Tanks, CVC-169 Control Switch to BMS/Auto positions as necessary to maintain VCT pressure and level within normal operating bands.
	ATC	When Primary Makeup Water Batch Counter has counted down to desired value, then verify Primary Makeup Water Control Valve, PMU-144, Closed.
	ATC	Procedure note Step 6.9.12 may be repeated as necessary to achieve desired total Primary Makeup Water addition for plant conditions.
	ATC	If additional Primary Makeup Water addition is required and with SM/CRS permission, then perform the following: Reset Primary Makeup Water Batch Counter.

Op Test No.:	NRC	Scenario #	4	Event #	4	Page	10	of 21

Event Description: Direction given to raise power to < 50% using OP-010-004, Power Operations.

Time	Position	Applicant's Actions or Behavior
	ATC	Verify Primary Makeup Water Control Valve, PMU-144, Intermediate or Open.
	ATC	Observe Primary Makeup water flow rate for proper indication.
	ATC	When Primary Makeup Water Batch Counter has counted down to desired value, then verify Primary Makeup Water Control Valve, PMU-144, Closed
	ATC	Verify Primary Makeup Water Flow controller, PMU-IFIC-0210X, in Manual.
	ATC	Verify both Primary Makeup Water Flow controller, PMU-IFIC-0210X, output and setpoint potentiometer set to zero.
	ATC	Close VCT Makeup Valve, CVC-510.
	ATC	Place Makeup Mode selector switch to MANUAL.
	ATC	Verify VCT Inlet/Bypass To Holdup Tanks, CVC-169, aligned to the VCT and control switch in AUTO.
	CREW	When Reactor Coolant System (RCS) Tavg rises, then match Tavg and Tref by raising Turbine load in accordance with OP-005-007, Main Turbine and Generator.
	Crew	Maintain RCS Cold Leg Temperature 541°F to 549°F.
	BOP	Commence raising Main Turbine load by performing the following:
		To change Load/Rate perform the following:
		• Depress LOAD RATE MW/MIN pushbutton.
		• Set selected rate in Display Demand Window.
		• Depress ENTER pushbutton.

Op Test No.:	NRC	Scenario #	4	Event #	4	Page	11	of 21

Event Description: Direction given to raise power to < 50% using OP-010-004, Power Operations.

Time	Position	Applicant's Actions or Behavior
	BOP	Procedure note Prior to changing Reference Demand, Main Turbine load must not be changing.
	BOP	To change Main Turbine load, perform the following:
		• Depress REFERENCE pushbutton.
		• Set desired load in Reference Demand Window.
		• Depress ENTER pushbutton.
		• Depress GO pushbutton.
		This manipulation is performed at CP-1. The BOP will set up the Main Turbine controls. The ATC will direct the BOP when to commence unloading the Main Turbine based on the rise in RCS Cold Leg temperature.
	ATC	Operate CEAs to maintain ASI using CEA Reg. Group 6 or Group P Control Element Assemblies. Operate CEAs in Manual Group mode as follows:
	ATC	Procedure caution (1) Criticality shall be anticipated any time CEAs are withdrawn and the reactor is not critical. (2) Observe applicable group insertion limits in accordance with Technical Specification 3.1.3.6 (Reg group), and Technical Specification 3.1.3.5 (Shutdown Banks). (3) Improper operation of CEAs in manual group mode may cause a reactor trip based on an out-of-sequence condition. (4) CEA initialization program must be running in the Plant Monitoring Computer to have group stops and sequential permissives available.
	ATC	Verify Plant Monitoring Computer operable in accordance with OP-004-012, Plant Monitoring Computer.
	ATC	Position Group Select switch to desired group.

Op Test No.:	NRC	Scenario #	4	Event #	4	Page	12	of 21

Event Description: Direction given to raise power to < 50% using OP-010-004, Power Operations.

Time	Position	Applicant's Actions or Behavior
	ATC	Place Mode Select switch to MG and verify the following: White lights Illuminated on Group Selection Matrix for selected group MG light Illuminates
	ATC	Operate CEA Manual Shim switch to WITHDRAW or INSERT group to desired height while monitoring the following: CEA Position Indicator selected CEA group is moving in desired direction. If Reactor is critical, then monitor the following: • Reactor Power • Reactor Coolant System (RCS) temperature • Axial Shape Index (ASI)
	ATC	Procedure note The Operator should remain in the area in front of the CEA Drive Mechanism Control Panel when the Mode Select switch is not in OFF.
	ATC	When desired set of moves have been completed, then place Mode Select switch to OFF.
Examiner Note This event is complete when the desired power ascension has been accomplished Or As directed by the Lead Evaluator.		

Op Test No.:	NRC	Scenario #	4	Event #	5 / 6 / 7	Page	13	of	21

Event Description: Inadvertent Containment Spray Actuation Signal, secure Containment Spray Pumps, CC-641 fails to reopen, Reactor trip, secure all RCPs

Time	Position	Applicant's Actions or Behavior
	ATC / BOP	Recognize and report indications of a Containment Spray Actuation.
		Alarms
		• Numerous alarms on Panels H, SA, and SB for RCP low CCW flow
		• Numerous alarms on Panel M for Containment Spray Pump A and Train A isolation valve
		• Numerous alarms on Panel M for Containment Spray Pump B and Train B isolation valve
		Indications
		• Containment Spray Pumps A and B running.
		• CS-125 A and B open.
		• Containment Spray Header flow on Trains A and B.
		• CC-710, CC-713, and CC-641 indicate closed.
	CRS	Enter and direct the implementation of OP-901-504, Inadvertent ESFAS Actuation.
	CRS	IF an inadvertent CSAS occurs, THEN perform the following: IF a Reactor Trip occurs, THEN GO TO OP-902-000, STANDARD POST TRIP ACTIONS AND perform concurrently with this procedure. GO TO Subsection E2, Inadvertent CSAS.
	BOP	Secure BOTH Containment Spray Pumps by placing each control switch to OFF.
	CRS	Procedure caution If Component Cooling Water is lost to Reactor Coolant Pump seals for >10 minutes, then restoring Component Cooling Water to Reactor Coolant Pumps may result in seal failure.

Op Test No.:	NRC	Scenario #	4	Event #	5 / 6 / 7	Page	14	of 21

Event Description: Inadvertent Containment Spray Actuation Signal, secure Containment Spray Pumps, CC-641 fails to reopen, Reactor trip, secure all RCPs

Time	Position	Applicant's Actions or Behavior
	BOP	Within 3 minutes restore CCW flow to Reactor Coolant Pumps as follows: Open the following valves:
		• CC 710 RCP OUTLET INSIDE ISOL.
		• CC 641 RCP INLET OUTSIDE ISOL
		• CC 713 RCP OUTLET OUTSIDE ISOL
	Note	CC-641 will not reopen when the control switch is taken to open.
	CRS	IF in Mode 1 OR 2 AND CCW flow can NOT be restored to Reactor Coolant Pumps within 3 minutes, THEN perform the following: • Trip the Reactor. • Stop the affected Reactor Coolant Pumps. • GO TO OP-902-000, STANDARD POST TRIP ACTIONS.
	ATC	Trip the reactor on direction from the CRS.
Critical Task Trip any RCP not satisfying RCP operating limits. This task is satisfied by securing all RCPs within 3 minutes of loss of CCW flow.		
	ATC	Following tripping of the reactor, secure all running Reactor Coolant Pumps as follows: • Place each RCP control switch to stop.
	Note	This is done at CP-2. At this point, the RCPs will be operating with no CCW flow since the actuation of Containment Spray. This condition is only allowed for 3 minutes.
	CRS	Direct ATC and BOP to carry out Standard Post trip Actions.

Op Test No.:	NRC	Scenario #	4	Event #	5 / 6 / 7	Page	15	of 21

Event Description: Inadvertent Containment Spray Actuation Signal, secure Containment Spray Pumps, CC-641 fails to reopen, Reactor trip, secure all RCPs

Time	Position	Applicant's Actions or Behavior
	ATC	Determine **Reactivity Control** acceptance criteria are met: • Check reactor power is dropping. • Check startup rate is negative. • Check less than **TWO** CEAs are **NOT** fully inserted.
	BOP	Determine **Maintenance of Vital Auxiliaries** acceptance criteria are met: Check the Main Turbine is tripped: • Governor valves closed • Throttle valves closed
	BOP	Check the Main Generator is tripped: • GENERATOR BREAKER A tripped • GENERATOR BREAKER B tripped • EXCITER FIELD BREAKER tripped
	BOP	Check station loads are energized from offsite electrical power as follows: **Train A** • A1, 6.9 KV non safety bus • A2, 4.16 KV non safety bus • A3, 4.16 KV safety bus • A-DC electrical bus • A or C vital AC Instrument Channel **Train B** • B1, 6.9 KV non safety bus • B2, 4.16 KV non safety bus • B3, 4.16 KV safety bus • B-DC electrical bus B or D vital AC Instrument Channel

Op Test No.:	NRC	Scenario #	4	Event #	5 / 6 / 7	Page	16	of	21

Event Description: Inadvertent Containment Spray Actuation Signal, secure Containment Spray Pumps, CC-641 fails to reopen, Reactor trip, secure all RCPs

Time	Position	Applicant's Actions or Behavior
	ATC	Determine **RCS Inventory Control** acceptance criteria are met: Check that the following conditions exist: • Pressurizer level is 7% to 60% • Pressurizer level is trending to 33% to 60% • Check RCS subcooling is greater than or equal to 28ºF.
	Note	The Steam Generator tube rupture ramps in during this time. Pressurizer level should still meet this safety function at this time.
	ATC	Determine **RCS Pressure Control** acceptance criteria are met by checking that **BOTH** of the following conditions exist: • Pressurizer pressure is 1750 psia to 2300 psia • Pressurizer pressure is trending to 2125 psia to 2275 psia
	ATC	Determine **Core Heat Removal** acceptance criteria are met: • Check at least one RCP is operating. • Check operating loop ΔT is less than 13ºF. • Check RCS subcooling is greater than or equal to 28ºF.
		This should be N/A since all RCPs should have been secured due to the CSAS initiation.
	BOP	Determine **RCS Heat Removal** acceptance criteria are met: Check that at least one steam generator has **BOTH** of the following: • Steam generator level is 5% to 80% NR • Main Feedwater is available to restore level within 50%-70% NR.
	ATC	Check RCS TC is 530ºF to 550ºF
	BOP	Check steam generator pressure is 885 psia to 1040 psia.

Op Test No.:	NRC	Scenario #	4	Event #	5 / 6 / 7	Page	17	of	21

Event Description: Inadvertent Containment Spray Actuation Signal, secure Containment Spray Pumps, CC-641 fails to reopen, Reactor trip, secure all RCPs

Time	Position	Applicant's Actions or Behavior
	BOP	Check Feedwater Control in Reactor Trip Override: • MAIN FW REG valves are closed • STARTUP FW REG valves are 13% to 21% open • Operating main Feedwater pumps are 3800 rpm to 4000 rpm
	BOP	Reset moisture separator reheaters, and check the temperature control valves closed.
	ATC	Determine **Containment Isolation** acceptance criteria are met: • Check containment pressure is less than 16.4 psia. • Check **NO** containment area radiation monitor alarms **OR** unexplained rise in activity. • Check **NO** steam plant activity monitor alarms **OR** unexplained rise in activity.
	Note	There will be steam plant activity at this point, but there is no contingency action for this step linked to steam plant activity.
	BOP	Determine **Containment Temperature and Pressure Control** acceptance criteria are met: • Check containment temperature is less than or equal to 120ºF. • Check containment pressure is less than 16.4 psia.
Examiner Note This event is complete after the Reactor has been tripped and all RCPs are secured. Or As directed by the Lead Evaluator. Examiner Note The last malfunction ramps in during this event.		

Op Test No.:	NRC	Scenario #	4	Event #	7	Page	18	of 21

Event Description: Steam Generator #1 tube rupture ramps in over 3 minute period.

Time	Position	Applicant's Actions or Behavior
	ATC / BOP	Recognize and report indications of activity in Steam Generator #1.
		Alarms
		• Rad Monitoring System Activity Hi Hi (Cabinet L, A-8)
		• Vacuum Pump Exhaust Activity Hi/Monitor Trouble (Cabinet E, C-3)
		Indications
		• Rising activity in S/G #1.
		• Pressurizer level and pressure lowering
	CRS	After review of Standard Post Trip Actions, use Diagnostic Flow Chart of OP-902-009 to select appropriate optimal recovery procedure. • Proper use of chart will result in use of OP-902-007, Steam Generator Tube Rupture Recovery.
	Note	Due to the size of the leak and the trip from < 50%, the Pressurizer level drop will be slow.
	CRS	Direct implementation of OP-902-007.
	CRS	**IF** steam generator sample path is available, **THEN** direct Chemistry to sample **BOTH** steam generators for activity.
	Crew	Announce a Steam Generator Tube Rupture is in progress using the plant page.
	CRS	**IF** pressurizer pressure is less than 1684 psia, **THEN** verify SIAS has initiated.
	Crew	**IF** SIAS has initiated, **THEN**: Verify safety injection pumps have started. Check safety injection flow is within the following: • Appendix 2-E, "HPSI Flow Curve" • Appendix 2-F, "LPSI Flow Curve"

Op Test No.:	NRC	Scenario #	4	Event #	7	Page	19	of 21

Event Description: Steam Generator #1 tube rupture ramps in over 3 minute period.

Time	Position	Applicant's Actions or Behavior
	BOP	Commence a rapid RCS cooldown to less than 520 °F T_{HOT} using Steam Bypass valves.
	CRS	**IF** MSIS is **NOT** present, **THEN** lower the automatic initiation setpoints as the cooldown and depressurization proceed for MSIS (low SG Pressure).
		• The CRS should direct the ATC to perform this action during the rapid cooldown to < 520 $T_{HOT.}$
	ATC	Reset MSIS setpoints on all 4 channels at CP-7.
Critical Task Prevent opening the Main Steam Safety valves on Steam Generator #1 This task is satisfied by taking action to lower RCS pressure in accordance with step 12.		
	ATC	Depressurize the RCS: Maintain pressurizer pressure within **ALL** of the following criteria: • Within Appendix 2A-D, "RCS Pressure and Temperature Limits" • Less than 945 psia • Within 50 psi of the most affected steam generator pressure Operate Main or Auxiliary Pressurizer spray.
	Note	The ATC operator should receive direction from the CRS to perform this step. He should evaluate plant conditions and decide on a minimum RCS pressure. The critical task is satisfied when the applicant takes action to start reducing RCS pressure (< 945 PSIA does not need to be reached in the scenario).

Op Test No.:	NRC	Scenario #	4	Event #	7	Page	20	of 21

Event Description: Steam Generator #1 tube rupture ramps in over 3 minute period.

Time	Position	Applicant's Actions or Behavior
	BOP / ATC	**IF** HPSI throttle criteria are met, **THEN** perform **ANY** of the following: • Control charging and letdown flow • Throttle HPSI flow
	Crew	HPSI Throttle criteria includes. ALL of the following conditions are satisfied: • RCS subcooling is greater than or equal to 28 ºF • Pressurizer level is greater than 7% and controlled • ALL steam generators capable of steaming are being maintained or restored to within the following level: o 50% to 70% NR using MFW or EFW in auto or manual • RVLMS indicates level higher than Hot Leg by at least one of the following: o QSPDS REACTOR VESSEL LEVEL 5 NOT voided o VESSEL LEVEL PLENUM greater than or equal to 80%
	CRS	Determine the most affected steam generator by considering **ALL** of the following: • Steam generator activities • Main steam line radiation levels • Steam generator blowdown radiation monitor readings • Steam generator level rise when **NOT** feeding • One steam generator level rising faster than the other with feed and steaming rates being essentially the same for both • Feed flow mismatch between steam generators • Steam flow vs. feed flow mismatch in a steam generator prior to the reactor trip

Op Test No.:	NRC	Scenario #	4	Event #	7	Page	21	of 21

Event Description: Steam Generator #1 tube rupture ramps in over 3 minute period.

Time	Position	Applicant's Actions or Behavior
Critical Task Isolate Steam Generator #1 This task is satisfied by isolating Steam Generator #1 in accordance with step 17 after RCS T_{HOT} is reduced below 520 °F.		
	BOP	**When** the RCS TH is less than 520°F, **THEN** isolate Steam Generator #1:
		Place the ADV setpoint to 980 psig and verify the controller in AUTO.
		Verify the MSIV is closed.
		Verify the MFIV is closed.
		IF EFAS-1 is **NOT** initiated, **THEN** close EFW Isolation Valves: • EFW 228A SG 1 PRIMARY • EFW 229A SG 1 BACKUP
		Place EFW Flow Control Valves in MAN and close: • EFW 224A SG 1 PRIMARY • EFW 223A SG 1 BACKUP
		Close MS 401A, PUMP AB TURB STM SUPPLY SG 1
		Close Main Steam Line 1 Drains: • MS 120A NORMAL • MS 119A BYPASS
		Close Steam Generator Blowdown isolation valves: • BD 103A STM GEN 1 (OUT) • BD 102A STM GEN 1 (IN)
		Check the Main Steam Safety valves are closed.
Examiner Note This event is complete after Steam Generator #1 is isolated Or As directed by the Lead Evaluator.		

Facility: Waterford 3 Date of Exam: October 5, 2009 Operating Test No.: 1

APPLICANT	EVENT TYPE	Scenarios 1 CREW POSITION SRO	1 ATC	1 BOP	2 CREW POSITION SRO	2 ATC	2 BOP	3 CREW POSITION SRO	3 ATC	3 BOP	4 CREW POSITION SRO	4 ATC	4 BOP	TOTAL	MINIMUM(*) R	I	U
RO - 1 [redacted] SRO-I [ ] SRO-U [ ]	RX											4		1	1	1	0
	NOR									1				1	1	1	1
	I/C									3, 4, 5, 7		3, 7		6	4	4	2
	MAJ									6		6, 8		3	2	2	1
	TS													0	0	2	2
RO - 2 [redacted] SRO-I [ ] SRO-U [ ]	RX													0	1	1	0
	NOR			4									4	2	1	1	1
	I/C			3, 6, 7					2, 4, 8				1, 2, 5	9	4	4	2
	MAJ			5					6				6, 8	4	2	2	1
	TS													0	0	2	2
RO - 3 [redacted] SRO-I [ ] SRO-U [ ]	RX											4		1	1	1	0
	NOR			4						1				2	1	1	1
	I/C			3, 6 7						3, 4, 5, 7		3, 7		9	4	4	2
	MAJ			5						6		6, 8		4	2	2	1
	TS													0	0	2	2
RO - 4 [redacted] SRO-I [ ] SRO-U [ ]	RX													0	1	1	0
	NOR			4										1	1	1	1
	I/C			3, 6 7					2, 4, 8					6	4	4	2
	MAJ			5					6					2	2	2	1
	TS													0	0	2	2
RO - 5 [redacted] SRO-I [ ] SRO-U [ ]	RX		4											1	1	1	0
	NOR									1				1	1	1	1
	I/C		2							3, 4, 5, 7				5	4	4	2
	MAJ		5							6				2	2	2	1
	TS													0	0	2	2

Facility: Waterford 3 Date of Exam: October 5, 2009 Operating Test No.: 1

APPLICANT	EVENT TYPE	Scenarios 1 CREW POSITION SRO	1 ATC	1 BOP	2 CREW POSITION SRO	2 ATC	2 BOP	3 CREW POSITION SRO	3 ATC	3 BOP	4 CREW POSITION SRO	4 ATC	4 BOP	TOTAL	MINIMUM(*) R	I	U
RO ☐ SRO-I1,2 [redacted] SRO-U ☐	RX		4											1	1	1	0
	NOR							1			4			2	1	1	1
	I/C		2					2, 3, 4 5, 7, 8			1, 3, 5, 7			11	4	4	2
	MAJ		5					6			6, 8			4	2	2	1
	TS							1, 3			1, 2			4	0	2	2
RO ☐ SRO-I3 [redacted] SRO-U ☐	RX													0	1	1	0
	NOR	1, 4											4	3	1	1	1
	I/C	2, 3, 6, 7							2, 4, 8				1, 2, 5	10	4	4	2
	MAJ	5							6				6, 8	4	2	2	1
	TS	1, 2, 3												3	0	2	2
RO ☐ SRO-I ☐ SRO-U1 [redacted]	RX													0	1	1	0
	NOR	1, 4												2	1	1	1
	I/C	2, 3, 6, 7												4	4	4	2
	MAJ	5												1	2	2	1
	TS	1, 2, 3												3	0	2	2
RO ☐ SRO-I ☐ SRO-U2 [redacted]	RX													0	1	1	0
	NOR	1, 4						1						3	1	1	1
	I/C	2, 3, 6, 7						2, 3, 4 5, 7, 8						10	4	4	2
	MAJ	5						6						2	2	2	1
	TS	1, 2, 3						1, 3						5	0	2	2

Facility: W3 Date of Examination: 10/5/09 Operating Test No.: 1

Competencies	APPLICANTS															
	RO1 ■ SRO-I ☐ SRO-U ☐				RO2 ■ SRO-I ☐ SRO-U ☐				RO3 ■ SRO-I ☐ SRO-U ☐				RO4 ■ SRO-I ☐ SRO-U ☐			
	SCENARIO				SCENARIO				SCENARIO				SCENARIO			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Interpret/Diagnose Events and Conditions			1, 3, 4, 5, 7	3, 7	3, 6, 7		2, 4, 8	1, 2, 5	3, 6, 7		1, 3, 4, 5, 7	3, 7	3, 6, 7		2, 4, 8	
Comply With and Use Procedures (1)			1, 3, 4, 5, 7	3, 4	3, 6, 7		2, 4, 8	1, 2, 5	3, 6, 7		1, 3, 4, 5, 7	3, 4	3, 6, 7		1, 2, 5	
Operate Control Boards (2)			1, 3, 4, 5, 7	3, 4, 7	3, 4, 5, 6, 7		2, 4, 6, 8	1, 2, 5	3, 4, 5, 6, 7		1, 3, 4, 5, 7	3, 4, 7	3, 4, 5, 6, 7		1, 2, 5	
Communicate and Interact			1, 3, 4, 5, 7	3, 4, 6, 7, 8	3, 4, 5, 6, 7		2, 4, 6, 8	1, 2, 4, 5, 6, 8	3, 4, 5, 6, 7		1, 3, 4, 5, 7	3, 4, 6, 7, 8	3, 4, 5, 6, 7		1, 2, 4, 5, 6, 8	
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.

Rev 1

Facility: W3 Date of Examination: 10/5/09 Operating Test No.: 1

Competencies	APPLICANTS															
	RO5 ■ SRO-I ☐ SRO-U ☐				RO ☐ SRO-I1/2 ■ SRO-U ☐				RO ☐ SRO-I3 ■ SRO-U ☐				RO ☐ SRO-I ☐ SRO-U1 ■			
	SCENARIO				SCENARIO				SCENARIO				SCENARIO			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Interpret/Diagnose Events and Conditions	2, 4		1, 3, 4, 5, 7		2, 4		2, 4, 8	1, 2, 5	3, 6, 7		2, 4, 8	1, 2, 5	3, 6, 7			
Comply With and Use Procedures (1)	2, 4		1, 3, 4, 5, 7		2, 4		2, 4, 8	1, 2, 5	3, 6, 7		2, 4, 8	1, 2, 5	3, 6, 7			
Operate Control Boards (2)	2, 4, 5		1, 3, 4, 5, 7		2, 4, 5		2, 4, 6, 8	1, 2, 5			2, 4, 6, 8	1, 2, 5				
Communicate and Interact	2, 4, 5		1, 3, 4, 5, 7		2, 4, 5		1, 2, 3, 4, 5, 6, 7, 8	1, 2, 4, 5, 6, 8	3, 4, 5, 6, 7		2, 4, 6, 8	1, 2, 4, 5, 6, 8	3, 4, 5, 6, 7			
Demonstrate Supervisory Ability (3)							1, 2, 3, 4, 5, 6, 7, 8	1, 2, 3, 4, 5, 6, 7, 8	1, 2, 3, 4, 5, 6, 7				1, 2, 3, 4, 5, 6, 7			
Comply With and Use Tech. Specs. (3)							1, 3	1, 2	1, 2, 3				1, 2, 3			

Notes:
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(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.

Facility: W3 Date of Examination: 10/5/09 Operating Test No.: 1

Competencies	APPLICANTS															
	RO ☐ SRO-I ☐ SRO-U2 ☒				RO ☐ SRO-I ☐ SRO-U ☐				RO ☐ SRO-I ☐ SRO-U ☐				RO ☐ SRO-I ☐ SRO-U ☐			
	SCENARIO				SCENARIO				SCENARIO				SCENARIO			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Interpret/Diagnose Events and Conditions	3, 6, 7		2, 4, 8													
Comply With and Use Procedures (1)	3, 6, 7		2, 4, 8													
Operate Control Boards (2)																
Communicate and Interact	3, 4, 5, 6, 7		1, 2, 3, 4, 5, 6, 7, 8													
Demonstrate Supervisory Ability (3)	1, 2, 3, 4, 5, 6, 7		1, 2, 3, 4, 5, 6, 7, 8													
Comply With and Use Tech. Specs. (3)	1, 2, 3		1, 3													

Notes:
(1) Includes Technical Specification compliance for an RO.
(2) Optional for an SRO-U.
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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.