Admin JPM
RO-A1.1

Facility: Davis-Besse **Task No:** 004-006-01-0100

Task Title: Perform a BWST Fill Calculation

K/A Reference: 2.1.23 (4.3) **Job Performance Measure No**: RO-A1.1 (JPM 172)

Examinee: _____

NRC Examiner: _____ **Date:** _____

Method of testing:

Simulated Performance ___ Actual Performance _X_

Classroom _X_ Simulator ___ Plant ___

Read to the examinee:
I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this job performance measure will be satisfied.

Initial Conditions:
The plant conditions are specified in the Initial Conditions and Initiating Cues.

Task Standard:
Perform a BWST fill calculation in accordance with Attachment 4 of DB OP-06015, Borated Water Storage Tank Operating Procedure

Required Materials:
Attachment 4 of DB-OP-06015
Calculator

General References:
None

Initiating Cue:
The Initiating Cues are specified in the Examiner/Student Copy Performance Measure pages.

Time Critical Task:
No

Alternate Path:
No

Validation Time:
30 minutes

EXAMINER COPY

INITIAL CONDITIONS:

The plant is in Mode 5 following a refueling outage

The BWST is at 38 feet and 2640 ppmB

BAAT 1 is at 12000 ppmB

CWRT 1 is at 1100 ppmB

The START program is NOT available

INITIATING CUES:

The Shift Manager desires the BWST level to be raised to 40.5 feet and boron concentration maintained at 2640 ppmB

The Unit Supervisor directs you to perform a BWST fill calculation in accordance with Attachment 4 of DB-OP-06015, Borated Water Storage Tank Operating Procedure using Boric Acid Addition Tank 1 and Clean Waste Receiver Tank 1

(Provide the examinee a copy of Attachment 4 of DB-OP-06015 and a calculator)

CANDIDATE COPY

INITIAL CONDITIONS:

The plant is in Mode 5 following a refueling outage

The BWST is at 38 feet and 2640 ppmB

BAAT 1 is at 12000 ppmB

CWRT 1 is at 1100 ppmB

The START program is NOT available

INITIATING CUES:

The Shift Manager desires the BWST level to be raised to 40.5 feet and boron concentration maintained at 2640 ppmB

The Unit Supervisor directs you to perform a BWST fill calculation in accordance with Attachment 4 of DB-OP-06015, Borated Water Storage Tank Operating Procedure using Boric Acid Addition Tank 1 and Clean Waste Receiver Tank 1

PERFORMANCE INFORMATION

NOTE: Critical steps denoted with a "C". Failure to meet any one of these standards for this item constitutes failure. Sequence is assumed unless denoted in the "Comments".

START TIME: _____

1. PERFORMANCE STEP: Determine Calculation Method

   STANDARD: Use Method B of Attachment 4

   CUE: **None**

   _____
   SAT UNSAT

2. PERFORMANCE STEP: Calculate the initial volume of the BWST
   .....C.....

   STANDARD: 12,962 gal/ft x 38 ft + 4316 gal = 496872 gal
   Enter 496872 gal and 2640 ppmB

   CUE: **None**

   _____
   SAT UNSAT

3. PERFORMANCE STEP: Calculate desired BWST volume after the solution addition
   .....C.....

   STANDARD: 12,962 gal/ft x 40.5 ft + 4316 gal = 529277 gal
   Enter 529277 gal and 2640 ppmB

   CUE: **None**

   _____
   SAT UNSAT

4. PERFORMANCE STEP: Calculate total volume to be added to the BWST
   .....C.....

   STANDARD: 529277 gal - 496872 gal = 32405 gal

   CUE: **None**

   _____
   SAT UNSAT

5. PERFORMANCE STEP: Initiate Part 2 of Section B of Attachment 4

   STANDARD: Enter the following values in Part 2:
   Volume to be added - 32405 gal
   Boron concentration of solution - 2640 ppmB
   Boron source and concentration - BAAT 1, 12,000 ppmB
   Water source and concentration - CWRT 1, 1100 ppmB

   CUE: **None**

   _____
   SAT UNSAT

6. PERFORMANCE STEP: Calculate volume of acid solution
   .....C.....

   STANDARD: $\frac{32405 \text{ gal} \times (2640 \text{ ppmB} - 1100 \text{ ppmB})}{12000 \text{ ppmB} - 1100 \text{ ppmB}} = 4578.3211 \text{ gal}$

   NOTE: Acceptable range is 4578 to 4579 gal

   CUE: **None**

   _____
   SAT UNSAT

7. PERFORMANCE STEP: Calculate volume of water solution
   .....C.....

   STANDARD: 32405 gal – 4578.3211 gal = 27826.6789 gal

   NOTE: Acceptable range is 27826 to 27827 gal

   CUE: **None**

   _____
   SAT UNSAT

8. PERFORMANCE STEP: Complete Attachment 4

   STANDARD: Sign and date attachment

   CUE: **None**

   _____
   SAT UNSAT

TERMINATING CUES: This JPM is complete. (Terminated by the examinee)

END TIME_____

Admin JPM
RO-A1.2

Facility: Davis-Besse **Task No:** 004-006-01-0100

Task Title: Determine the boron concentration needed to ensure 1% SDM with two stuck rods

K/A Reference: 2.1.25 (3.9) **Job Performance Measure No**: RO-A1.2 (JPM 272)

Examinee: _____

NRC Examiner: _____ **Date:** _____

Method of testing:

Simulated Performance ___ Actual Performance _X_

Classroom _X_ Simulator ___ Plant ___

Read to the examinee:
I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this job performance measure will be satisfied.

Initial Conditions:
The plant conditions are specified in the Initial Conditions and Initiating Cues.

Task Standard:
Determine the boron concentration needed to ensure 1% SDM with two stuck rods

Required Materials:
DB-NE-06202
DB-NE-06201
Calculator and ruler

General References:
None

Initiating Cue:
The Initiating Cues are specified in the Examiner/Student Copy Performance Measure pages.

Time Critical Task:
No

Alternate Path:
No

Validation Time:
30 minutes

EXAMINER COPY

INITIAL CONDITIONS:

The plant is in Mode 3 following a reactor trip.

Two control rods failed to insert on the trip.

The START program is not available.

The following conditions exist:

- Burnup: 500 EFPD
- Tave: 552°F

The Reactor Engineer reports the following values:

- Reactivity worth due to transient poisons: (-) 2.6 %ΔK/K
- Correction factor for Boron 10 depletion: 0.96
- Reactivity Anomaly: 0.0

INITIATING CUES:

The Unit Supervisor directs you to determine the boron concentration needed to ensure 1% shutdown margin in accordance with Section 14 of DB-NE-06202, Reactivity Balance Calculations, and DB-NE-06201, Reactor Operators Curve Book

It is desired to take credit for transient poisons

Provide Candidate a copy of;

- **DB-NE-06202**
- **DB-NE-06201**
- **Ruler and calculator**

CANDIDATE COPY

INITIAL CONDITIONS:

The plant is in Mode 3 following a reactor trip.

Two control rods failed to insert on the trip.

The START program is not available.

The following conditions exist:

- Burnup: 500 EFPD
- Tave: 552°F

The Reactor Engineer reports the following values:

- Reactivity worth due to transient poisons: (-) 2.6 %ΔK/K
- Correction factor for Boron 10 depletion: 0.96
- Reactivity Anomaly: 0.0

INITIATING CUES:

The Unit Supervisor directs you to determine the boron concentration needed to ensure 1% shutdown margin in accordance with Section 14 of DB-NE-06202, Reactivity Balance Calculations, and DB-NE-06201, Reactor Operators Curve Book

It is desired to take credit for transient poisons

PERFORMANCE INFORMATION

NOTE: Critical steps denoted with a "C". Failure to meet any one of these standards for this item constitutes failure. Sequence is assumed unless denoted in the "Comments".

START TIME: _____

1. PERFORMANCE STEP: Determine B (ROCB SDM)
   .....C.....

   STANDARD: Determine B(ROCB SDM) from Figure 6C. Determines the value to be 1475 to 1485 ppmB and enters this value on Attachment 10.

   COMMENT: Actual value is 1480 ppmB %ΔK/K.

   COMMENT: Sequence NOT required for this JPM except for last step

   CUE: **None**

   _____
   SAT UNSAT

2. PERFORMANCE STEP: Determine CF(B10)

   STANDARD: Enters 0.96 value for CF(B10) value from Initial Conditions

   CUE: **None**

   _____
   SAT UNSAT

3. PERFORMANCE STEP: Determine Reactivity Worth of HFP Anomaly

   STANDARD: Enters 0 for anomaly value from Initial Conditions

   CUE: **None**

   _____
   SAT UNSAT

4. PERFORMANCE STEP: Determine the Differential Boron Worth (DBW).

   STANDARD: Determine DBW value from Figure 5A. Determines value of – 0.00719 to - 0.00723 %ΔK/K.

   COMMENT: Actual value is -0.00721 %ΔK/K. Student may skip this step since it will divide into zero and be zero regardless of the value.

   CUE: **None**

   _____
   SAT UNSAT

5. PERFORMANCE STEP: Determine Transient Poison worth, ρ(tp), for Transient Reactivity Boron Equivalent (B(tr)

   STANDARD: Enters (–)2.6 %ΔK/K for ρ(tp) value from the Initial Conditions

   CUE: **None**

   SAT UNSAT

6. PERFORMANCE STEP: Determine Pu-239 worth, ρ(PU-max), for Transient Reactivity Boron Equivalent (B(tr)
   .....C.....

   STANDARD: From Figure 20B, determines a value of 0.1375 to 0.1385 %ΔK/K for ρ(PU-max)

   COMMENT: Actual value is 0.138 %ΔK/K

   CUE: **None**

   SAT UNSAT

7. PERFORMANCE STEP: Determine Transient Poison Conversion Factor (TPCF) for Transient Reactivity Boron Equivalent, B(tr)
   .....C.....

   STANDARD: Determines a value of 85 from Table 1 of the ROCB

   CUE: **None**

   SAT UNSAT

8. PERFORMANCE STEP: Determine CF(B10) for Transient Reactivity Boron Equivalent, B(tr)

   STANDARD: Enters 0.96 value for CF(B10) value from Initial Conditions

   CUE: **None**

   SAT UNSAT

9. PERFORMANCE STEP: Determine Transient Reactivity Boron Equivalent, B(tr)
   .....C.....

   STANDARD: Performs calculation for B(tr) on Attachment 10. Determine value of 217.94 to 218.04 ppmB

   Comment: Actual value is 217.99

   CUE: **None**

   SAT UNSAT

10. PERFORMANCE STEP: Determine Minimum RCS Boron Concentration for 1% SDM
.....C.....

STANDARD: Performs calculation on Attachment 10. Determine value of 1331 to1343 ppmB

COMMENT: Actual value is 1336.9 ppmB

CUE: **None**

_____
SAT UNSAT

TERMINATING CUES: This JPM is complete. (Terminated by the examinee)

END TIME_____

Admin JPM
RO-A2

Facility: Davis-Besse **Task No:** 119-035-0100

Task Title: Determine isolation boundary and effect on safety related equipment

K/A Reference: 2.2.37 (3.6) **Job Performance Measure No**: RO-A2 (NEW-319)

Examinee: _____

NRC Examiner: _____ **Date:** _____

Method of testing:

Simulated Performance ___ Actual Performance _X_

Classroom _X_ Simulator ___ Plant ___

Read to the examinee:
I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this job performance measure will be satisfied.

Initial Conditions:
The plant conditions are specified in the Initial Conditions and Initiating Cues

Task Standard:
Identify boundary for isolating CC269 and recommend starting CCW Pump 1 to supply cooling water to MUP 1 or swap MUPs due to loss of non-essential cooling within 1 hour

Required Materials:
Operational Schematics OS-021 SH 1 and 2

General References:
None

Initiating Cue:
The Initiating Cues are specified in the Examiner/Student Copy Performance Measure pages.

Time Critical Task:
No

Alternate Path:
No

Validation Time:
20 minutes

EXAMINER COPY

INITIAL CONDITIONS:

The Plant is at 100% Power

Component Cooling Water Pump 2 is in service

Make-up Pump 1 is in service

A small leak has developed in the piping near CC269, COMPONENT COOLING NON-ESSENTIAL HEADER TO MAKE-UP PUMPS SUPPLY HEADER TEST CONNECTION

INITIATION CUE:

The Shift Manager directs you to;

1. Determine the isolation boundaries for CC269, COMPONENT COOLING NON-ESSENTIAL HEADER TO MAKE-UP PUMPS SUPPLY HEADER TEST CONNECTION

AND

2. List what equipment is affected and recommend what actions should be taken on this page below

(Hand Candidate Copy of Operational Schematics OS-021 SH 1 and 2)

CANDIDATE COPY

INITIAL CONDITIONS:

The Plant is at 100% Power

Component Cooling Water Pump 2 is in service

Make-up Pump 1 is in service

A small leak has developed in the piping near CC269, COMPONENT COOLING NON-ESSENTIAL HEADER TO MAKE-UP PUMPS SUPPLY HEADER TEST CONNECTION

INITIATION CUE:

The Shift Manager directs you to;

1. Determine the isolation boundaries for CC269, COMPONENT COOLING NON-ESSENTIAL HEADER TO MAKE-UP PUMPS SUPPLY HEADER TEST CONNECTION

AND

2. List what equipment is affected and recommend what actions should be taken on this page below

PERFORMANCE INFORMATION

NOTE: Critical steps denoted with a "C". Failure to meet any one of these standards for this item constitutes failure. Sequence is NOT critical unless denoted in the "Comments".

START TIME: _____

NOTE: STEPS CAN BE PERFORMED IN ANY SEQUENCE

1. PERFORMANCE STEP: Determines that valve CC1460 must be closed
   .....C.....

   STANDARD: Identifies CC1460, CCW TO MAKE-UP PUMP HEADER INLET will be closed

   NOTE: CC125, CCW TO MAKE-UP PUMP & EMERGENCY INSTRUMENT AIR COMPRESSOR HEADER INLET ISOLATION is also acceptable

   CUE: **None**

   SAT UNSAT

2. PERFORMANCE STEP: Determines that valve CC127 must be closed
   .....C.....

   STANDARD: Identifies CC127, MAKE-UP PUMP 1 CCW INLET STOP CHECK TO LUBE OIL COOLER will be closed

   CUE: **None**

   SAT UNSAT

3. PERFORMANCE STEP: Determines that CC128 should be closed (stop check valve)

   STANDARD: Identifies CC128, MAKE-UP PUMP 2 CCW INLET STOP CHECK TO LUBE OIL COOLER will be closed

   CUE: **None**

   SAT UNSAT

3. PERFORMANCE STEP: Identifies the effect of isolating CC269 will have on plant equipment
.....C.....

COMMENT: CC1460, CCW TO MAKE UP PUMP HEADER INLET, supplies non-essential CCW to the Makeup Pumps and the Makeup Pump Aux Gear Oil Systems. When CC1460 is closed, Makeup Pump oil bearing cooling water will be supplied by the respective CCW Essential Lines for the Makeup Pumps.

MU Pump operation without CCW cooling shall be limited to a maximum of 1 hour.

STANDARD: Identifies that closing CC1460 OR CC125 will isolate non-essential cooling water to MUP 1

Recommends starting CCW Pump 1 to supply essential header cooling water to MUP 1

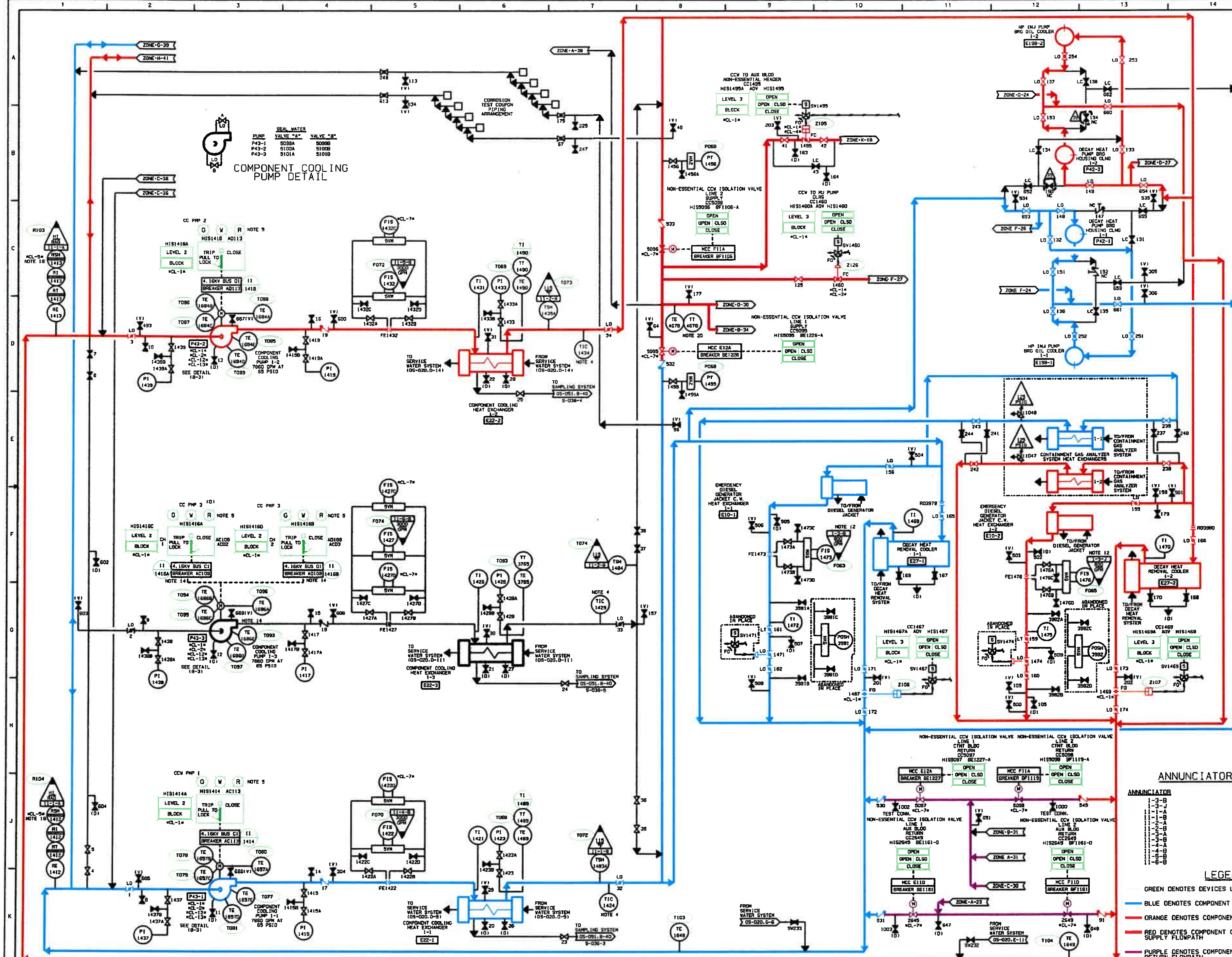
NOTE: Swap MUPs is also acceptable

CUE: **None**

SAT UNSAT

TERMINATING CUES: This JPM is complete (Terminated by the examinee)

END TIME _____



CONTROL LOGICS

CL-1 WITH REGARD TO THE COMPONENT COOLING WATER SYSTEM, THE FOLLOWING ACTIONS WILL OCCUR IN THE EVENT OF A SAFETY FEATURES ACTUATION SYSTEM (SFAS) SIGNAL:

COMPONENT	SIGNAL	ZONE	ACTION	REMARKS
LEVEL 2 SIGNAL				
PUMP 1-1	SA231A	K-3	STARTS	BLOCK PUSHBUTTON
PUMP 1-2	SA232A	D-3	STARTS	BLOCK PUSHBUTTON
PUMP 1-3	SA231B, SA232B	G-3	STARTS	BLOCK PUSHBUTTON
LEVEL 3 SIGNAL				
VALVE 1460	SA322A	C-10	CLOSES	BLOCK PUSHBUTTON
VALVE 1467	SA311C	H-10	OPENS	BLOCK PUSHBUTTON
VALVE 1469	SA312C	H-13	OPENS	BLOCK PUSHBUTTON
VALVE 1495	SA321A	B-9	CLOSES	BLOCK PUSHBUTTON
LEVEL 4 SIGNAL				
VALVE 1328	SA421D	B-34	CLOSES	BLOCK PUSHBUTTON IF VALVE >20% OPEN.
VALVE 1338	SA422D	C-34	CLOSES	BLOCK PUSHBUTTON IF VALVE >20% OPEN.
VALVE 1407A	SA421B	C-27	CLOSES	BLOCK PUSHBUTTON
VALVE 1407B	SA422B	C-29	CLOSES	BLOCK PUSHBUTTON
VALVE 1411A	SA421A	D-27	CLOSES	BLOCK PUSHBUTTON
VALVE 1411B	SA422A	D-29	CLOSES	BLOCK PUSHBUTTON
VALVE 1567A	SA421C	B-29	CLOSES	BLOCK PUSHBUTTON IF VALVE >20% OPEN.
VALVE 1567B	SA422C	B-30	CLOSES	BLOCK PUSHBUTTON IF VALVE >20% OPEN.

TO STOP A COMPONENT COOLING WATER PUMP OR TO CHANGE POSITION OF A COMPONENT COOLING WATER VALVE DURING AN SFAS, EACH COMPONENT'S "BLOCK" PUSHBUTTON MUST BE DEPRESSED FIRST.

CL-2 COMPONENT COOLING PUMP 1-1 (ZONE K-3) WILL TRIP IF ANY OF THE FOLLOWING CONDITIONS EXIST:

- PHASE A OR C TIME DELAY OVERCURRENT SENSED BY RELAY CO (SEE NOTE 5) AND PHASE A OR C INSTANTANEOUS OVERCURRENT SENSED BY RELAY IIT
- INSTANTANEOUS GROUND OVERCURRENT SENSED BY 50GS RELAY
- PHASE A OR C INSTANTANEOUS OVERCURRENT SENSED BY RELAY IIT

LOGIC FOR PUMPS 1-2 AND 1-3 (ZONES D-3 AND G-3) ARE SIMILIAR.

CL-3 COMPONENT COOLING WATER VALVE 1460 (ZONE C-10) WILL AUTOMATICALLY CLOSE IF COMPONENT COOLING WATER SURGE TANK LEVEL SIDE 2 ≤35 IN AS SENSED BY LSLL3758A (ZONE F-44).

CL-4 COMPONENT COOLING WATER AUXILIARY EQUIPMENT INLET VALVE 1495 (ZONE B-9) WILL AUTOMATICALLY CLOSE IF COMPONENT COOLING WATER SURGE TANK LEVEL SIDE 1 ≤47 IN AS SENSED BY LSLL3757A (ZONE F-38).

CL-5 COMPONENT COOLING WATER SURGE TANK ATMOSPHERIC VENT VALVE 1412 (ZONE A-43) WILL AUTOMATICALLY SHIFT TO THE MISC WASTE DRAIN TANK IF HIGH RADIATION IS SENSED BY RSH1412 OR RSH1413 (ZONES J-1 AND C-1).

CL-6 DELETED

CL-7 COMPONENT COOLING WATER LINE 1 VALVE 2645 (ZONE K-11) WILL AUTOMATICALLY CLOSE IF IT IS ≥ 20% OPEN AND COMPONENT COOLING WATER SURGE TANK LEVEL SIDE 1 IS ≤ 37.125 IN AS SENSED BY LSLL3757B (ZONE E-38) AND ≤ 37.25 IN AS SENSED BY LSLL3757C (ZONE D-38) OR THE BREAKERS FOR PUMPS 1-1 AND 1-3 ARE BOTH OPEN.

VALVE 2645 WILL AUTOMATICALLY OPEN IF

CONDITIONS I, II, III AND (IV OR V) EXIST:

I. VALVE ≤ 20% OPEN.
II. SURGE TANK LEVEL SIDE 1 ≥ 37.125 IN AS SENSED BY LSLL3757B AND LSLL3757C.
III. COMPONENT COOLING WATER FLOW ≤ 1000 GPM AS SENSED BY FIS1432C (ZONE C-5).
IV. BREAKER FOR PUMP 1-1 IS IN THE TEST OR RACKED OUT POSITION.
V. COMPONENT COOLING WATER FLOW ≤ 1000 GPM AS SENSED BY FIS1427C (ZONE F-5).

LOGIC FOR COMPONENT COOLING WATER HEADER DISCHARGE LINE 1 INLET ISOLATION VALVE 5095 (ZONE D-8) AND COMPONENT COOLING WATER HEADER INTAKE LINE 1 RETURN ISOLATION VALVE 5097 (ZONE J-11) IS SIMILAR.

LOGIC FOR COMPONENT COOLING WATER LINE 2 VALVE 2649 (ZONE K-12), COMPONENT COOLING WATER HEADER DISCHARGE LINE 2 INLET ISOLATION VALVE 5096 (ZONE C-8) AND COMPONENT COOLING WATER HEADER INTAKE LINE 2 RETURN ISOLATION VALVE 5098 (ZONE J-12) IS SIMILAR EXCEPT SURGE TANK LEVEL SIDE 2 IS ≤36.25 IN AS SENSED BY LSLL3758B (ZONE E-44) AND ≤36.75 IN AS SENSED BY LSLL3758C (ZONE D-44), COMPONENT COOLING WATER FLOW IS SENSED BY FIS1422D AND FIS1427D (ZONES J-5 AND F-5) AND COMPONENT COOLING WATER PUMP IS 1-2.

NOTES

1. ALL VALVES ARE PREFIXED WITH "CC" UNLESS OTHERWISE NOTED.
2. FOR GENERAL NOTES, PIPING SYMBOLS, INSTRUMENTATION SYMBOLS AND OPERATIONAL SCHEMATIC INDEX, SEE INDEX SHEET DWG OS-000.
3. DELETED
4. FOR THE OPERATION OF TIC1424, TIC1429 AND TIC1434 (ZONES K-7, G-7 AND D-7) SEE SERVICE WATER SYSTEM DWG OS-020. *CL-7*.
5. WHITE INDICATING LIGHT ON HANDSWITCHES HIS1414, HIS1416A, HIS1416B AND HIS1418 (ZONES J-3, F-2, F-4 AND C-3) ONLY ILLUMINATES WHEN TIME DELAYED OVERCURRENT ALARM RELAY HAS OPERATED.
6. WHENEVER THE COMPONENT COOLING WATER SYSTEM IS INOPERABLE, THE OPERATOR IS TO PLACE HANDSWITCH HS4801 (ZONE H-16) IN "NOT OPER" AS INDICATED BY THE "BYPASS" LIGHT (ZONE H-16).

CCW NORM NOT OPER
BYPASS
IL4801 HS4801
NOTE 6

NOTES CONT'D ON SH. 2

ANNUNCIATOR TABLE

ANNUNCIATOR	ANNUNCIATOR ENGRAVING
1-3-B	EDG 1 CCW FLOW LO
1-3-J	EDG 2 CCW FLOW LO
11-1-A	CCW RETURN RAD HI
11-1-B	CCW HX 1 OUTLET TEMP HI
11-2-A	CCW SURGE TK LVL LO-LO
11-2-B	CCW HX 2 OUTLET TEMP HI
11-3-A	CCW SURGE TK LVL LO
11-3-B	CCW HX 3 OUTLET TEMP HI
11-4-A	CCW SURGE TK LVL HI
11-4-B	CCW PMP 1 FLOW LO
11-5-B	CCW PMP 2 FLOW LO
11-6-B	CCW PMP 3 FLOW LO

LEGEND

GREEN DENOTES DEVICES LOCATED IN THE CONTROL ROOM

BLUE DENOTES COMPONENT COOLING WATER LINE 1 FLOWPATH

ORANGE DENOTES COMPONENT COOLING WATER LINE 2 FLOWPATH

RED DENOTES COMPONENT COOLING WATER SYSTEM COMMON SUPPLY FLOWPATH

PURPLE DENOTES COMPONENT COOLING WATER SYSTEM COMMON RETURN FLOWPATH

FOR CONTROL LOGICS, NOTES AND REFERENCES SEE OS-021 SH 2 AND SH 3

NO	DATE	REVISIONS	BY	CH'K					
39	4/4/16	INC. DUN 15-0040-001 -005 & 15-0041-001-005 BOTH REV.0	SBV	SAP	—	BTR	—	—	—
38	5/1/15	INC. DUN 15-0293-001 -002 REV.00	SBV	SAP	—	CDA	—	—	—
37	3/20/14	INC. DUN 11-0614-001 -005 REV.00	SBV	SAC	—	SSK	—	—	—
0	11/4/88	INFORMATION ONLY	HB	EWT	HRB	CML	JLL	HP	JAN

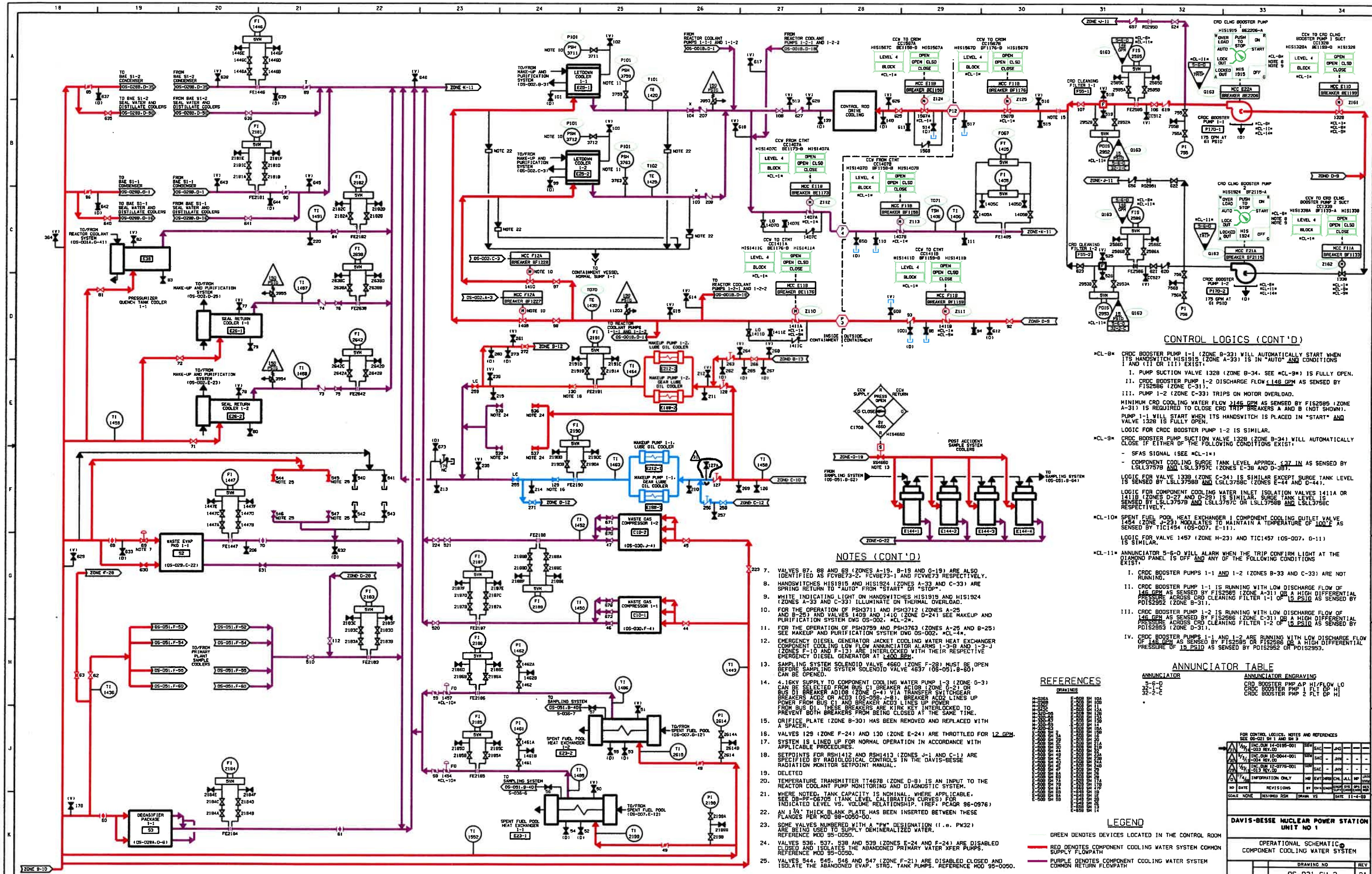
SCALE NONE | DESIGNED RSM | DRAWN ATR | DATE 11-4-88

DAVIS-BESSE NUCLEAR POWER STATION UNIT NO 1

OPERATIONAL SCHEMATIC
COMPONENT COOLING WATER SYSTEM

DRAWING NO OS-021 SH 1 REV 39

DB 04-04-16
DFN= /OPSCH/OS21S1.DGN



CONTROL LOGICS (CONT'D)

CL-8 CRDC BOOSTER PUMP 1-1 (ZONE B-33) WILL AUTOMATICALLY START WHEN ITS HANDSWITCH HIS1915 (ZONE A-33) IS IN "AUTO" AND CONDITIONS I AND (II OR III) EXIST:

I. PUMP SUCTION VALVE 1328 (ZONE B-34. SEE *CL-9*) IS FULLY OPEN.

II. CRDC BOOSTER PUMP 1-2 DISCHARGE FLOW ≤ 146 GPM AS SENSED BY FIS2586 (ZONE C-31).

III. PUMP 1-2 (ZONE C-33) TRIPS ON MOTOR OVERLOAD.

MINIMUM CRD COOLING WATER FLOW ≥146 GPM AS SENSED BY FIS2585 (ZONE A-31) IS REQUIRED TO CLOSE CRD TRIP BREAKERS A AND B (NOT SHOWN).

PUMP 1-1 WILL START WHEN ITS HANDSWITCH IS PLACED IN "START" AND VALVE 1328 IS FULLY OPEN.

LOGIC FOR CRDC BOOSTER PUMP 1-2 IS SIMILAR.

CL-9 CRDC BOOSTER PUMP SUCTION VALVE 1328 (ZONE B-34) WILL AUTOMATICALLY CLOSE IF EITHER OF THE FOLLOWING CONDITIONS EXIST:

- SFAS SIGNAL (SEE *CL-1*)
- COMPONENT COOLING SURGE TANK LEVEL APPROX. ≤37 IN AS SENSED BY LSLL3757B AND LSLL3757C (ZONES E-38 AND D-38).

LOGIC FOR VALVE 1338 (ZONE C-34) IS SIMILAR EXCEPT SURGE TANK LEVEL IS SENSED BY LSLL3758B AND LSLL3758C (ZONES E-44 AND D-44).

LOGIC FOR COMPONENT COOLING WATER INLET ISOLATION VALVES 1411A OR 1411B (ZONES D-27 AND D-29) IS SIMILAR. SURGE TANK LEVEL IS SENSED BY LSLL3757B AND LSLL3757C OR LSLL3758B AND LSLL3758C RESPECTIVELY.

CL-10 SPENT FUEL POOL HEAT EXCHANGER 1 COMPONENT COOLING OUTLET VALVE 1454 (ZONE J-23) MODULATES TO MAINTAIN A TEMPERATURE OF 100°F AS SENSED BY TIC1454 (OS-007, E-11).

LOGIC FOR VALVE 1457 (ZONE H-23) AND TIC1457 (OS-007, G-11) IS SIMILAR.

CL-11 ANNUNCIATOR 5-6-D WILL ALARM WHEN THE TRIP CONFIRM LIGHT AT THE DIAMOND PANEL IS OFF AND ANY OF THE FOLLOWING CONDITIONS EXIST:

I. CRDC BOOSTER PUMPS 1-1 AND 1-2 (ZONES B-33 AND C-33) ARE NOT RUNNING.

II. CRDC BOOSTER PUMP 1-1 IS RUNNING WITH LOW DISCHARGE FLOW OF 146 GPM AS SENSED BY FIS2585 (ZONE A-31) OR A HIGH DIFFERENTIAL PRESSURE ACROSS CRD CLEANING FILTER 1-1 OF 15 PSID AS SENSED BY PDIS2952 (ZONE B-31).

III. CRDC BOOSTER PUMP 1-2 IS RUNNING WITH LOW DISCHARGE FLOW OF 146 GPM AS SENSED BY FIS2586 (ZONE C-31) OR A HIGH DIFFERENTIAL PRESSURE ACROSS CRD CLEANING FILTER 1-2 OF 15 PSID AS SENSED BY PDIS2953 (ZONE D-31).

IV. CRDC BOOSTER PUMPS 1-1 AND 1-2 ARE RUNNING WITH LOW DISCHARGE FLOW OF 146 GPM AS SENSED BY FIS2585 OR FIS2586 OR A HIGH DIFFERENTIAL PRESSURE OF 15 PSID AS SENSED BY PDIS2952 OR PDIS2953.

ANNUNCIATOR TABLE

ANNUNCIATOR	ANNUNCIATOR ENGRAVING
5-6-D	CRD BOOSTER PMP ΔP HI/FLOW LO
32-1-C	CRDC BOOSTER PMP 1 FLT DP HI
32-2-C	CRDC BOOSTER PMP 2 FLT DP HI

NOTES (CONT'D)

7. VALVES 87, 88 AND 69 (ZONES A-19, B-19 AND G-19) ARE ALSO IDENTIFIED AS FCVBE73-2, FCVBE73-1 AND FCVWE73 RESPECTIVELY.
8. HANDSWITCHES HIS1915 AND HIS1924 (ZONES A-33 AND C-33) ARE SPRING RETURN TO "AUTO" FROM "START" OR "STOP".
9. WHITE INDICATING LIGHT ON HANDSWITCHES HIS1915 AND HIS1924 (ZONES A-33 AND C-33) ILLUMINATE ON THERMAL OVERLOAD.
10. FOR THE OPERATION OF PSH3711 AND PSH3712 (ZONES A-25 AND B-25) AND VALVES 1409 AND 1410 (ZONE D-24) SEE MAKEUP AND PURIFICATION SYSTEM DWG OS-002, *CL-2*.
11. FOR THE OPERATION OF PSH3759 AND PSH3763 (ZONES A-25 AND B-25) SEE MAKEUP AND PURIFICATION SYSTEM DWG OS-002, *CL-4*.
12. EMERGENCY DIESEL GENERATOR JACKET COOLING WATER HEAT EXCHANGER COMPONENT COOLING LOW FLOW ANNUNCIATOR ALARMS 1-3-B AND 1-3-J (ZONES F-10 AND F-13) ARE INTERLOCKED WITH THEIR RESPECTIVE EMERGENCY DIESEL GENERATOR AT ≥400 RPM.
13. SAMPLING SYSTEM SOLENOID VALVE 4660 (ZONE F-28) MUST BE OPEN BEFORE SAMPLING SYSTEM SOLENOID VALVE 4637 (OS-051.B-60) CAN BE OPENED.
14. 4.16KV SUPPLY TO COMPONENT COOLING WATER PUMP 1-3 (ZONE G-3) CAN BE SELECTED FROM BUS C1 BREAKER AC108 (ZONE G-2) OR BUS D1 BREAKER AD108 (ZONE G-4) VIA TRANSFER SWITCHGEAR BREAKERS ACD2 OR ACD3 (OS-058, J-8). BREAKER ACD2 LINES UP POWER FROM BUS C1 AND BREAKER ACD3 LINES UP POWER FROM BUS D1. THESE BREAKERS ARE KIRK KEY INTERLOCKED TO PREVENT BOTH BREAKERS FROM BEING CLOSED AT THE SAME TIME.
15. ORIFICE PLATE (ZONE B-30) HAS BEEN REMOVED AND REPLACED WITH A SPACER.
16. VALVES 129 (ZONE F-24) AND 130 (ZONE E-24) ARE THROTTLED FOR 12 GPM.
17. SYSTEM IS LINED UP FOR NORMAL OPERATION IN ACCORDANCE WITH APPLICABLE PROCEDURES.
18. SETPOINTS FOR RSH1412 AND RSH1413 (ZONES J-1 AND C-1) ARE SPECIFIED BY RADIOLOGICAL CONTROLS IN THE DAVIS-BESSE RADIATION MONITOR SETPOINT MANUAL.
19. DELETED
20. TEMPERATURE TRANSMITTER TT4678 (ZONE D-8) IS AN INPUT TO THE REACTOR COOLANT PUMP MONITORING AND DIAGNOSTIC SYSTEM.
21. WHERE NOTED, TANK CAPACITY IS NOMINAL. WHERE APPLICABLE, SEE DB-PF-06705 (TANK LEVEL CALIBRATION CURVES) FOR INDICATED LEVEL VS. VOLUME RELATIONSHIP. (REF: PCAQR 96-0976)
22. AN 1 3/4" THICK BLANK PLATE HAS BEEN INSERTED BETWEEN THESE FLANGES PER MOD 98-0050-00.
23. SOME VALVES NUMBERED WITH A "PW" DESIGNATION (i.e. PW32) ARE BEING USED TO SUPPLY DEMINERALIZED WATER. REFERENCE MOD 95-0050.
24. VALVES 536, 537, 538 AND 539 (ZONES E-24 AND F-24) ARE DISABLED CLOSED AND ISOLATES THE ABANDONED PRIMARY WATER XFER PUMPS. REFERENCE MOD 95-0050.
25. VALVES 544, 545, 546 AND 547 (ZONE F-21) ARE DISABLED CLOSED AND ISOLATE THE ABANDONED EVAP. STRG. TANK PUMPS. REFERENCE MOD 95-0050.

REFERENCES

DRAWINGS

M-036A	E-508 SH 10A
M-036B	E-508 SH 10B
M-036C	E-508 SH 11
M-042C	E-508 SH 12A
M-320-55	E-508 SH 12B
M-320-56	E-508 SH 13A
M-320-57	E-508 SH 13B
M-320-59	E-508 SH 14
M-320-63	E-508 SH 15A
E-508 SH 2	E-508 SH 15B
E-508 SH 3A	E-508 SH 16
E-508 SH 3B	E-508 SH 20
E-508 SH 3C	E-508 SH 21A
E-508 SH 3D	E-508 SH 21B
E-508 SH 4A	E-508 SH 22
E-508 SH 4B	E-508 SH 23A
E-508 SH 4C	E-508 SH 23B
E-508 SH 4D	E-508 SH 24A
E-508 SH 4E	E-508 SH 24B
E-508 SH 4F	E-508 SH 25
E-508 SH 6A	E-508 SH 26
E-508 SH 6B	E-508 SH 28
E-508 SH 7A	E-528 SH 17A
E-508 SH 7B	E-528 SH 17B
E-508 SH 8A	E-568 SH 47F
E-508 SH 8B	E-648 SH 1B
E-508 SH 9A	E-648 SH 1E
E-508 SH 9B	E-648 SH 2B
	E-648 SH 2E
	E-658 SH 13
	E-658 SH 14

LEGEND

GREEN DENOTES DEVICES LOCATED IN THE CONTROL ROOM

RED DENOTES COMPONENT COOLING WATER SYSTEM COMMON SUPPLY FLOWPATH

PURPLE DENOTES COMPONENT COOLING WATER SYSTEM COMMON RETURN FLOWPATH

FOR CONTROL LOGICS, NOTES AND REFERENCES SEE OS-021 SH 1 AND SH 3

NO	DATE	REVISIONS	BY	CH					
31	1/30/14	INC.DUN 14-0195-001 -003 REV.00	SBW	SAC	—	JHG	—	—	—
30	5/3/13	INC.DUN 10-0044-001 -004 REV.00	SBW	SAC	-	JHM	-	-	-
29	1/2/13	INC.DUN 12-0776-001 -013 REV.00	SBW	SAC	-	JHM	-	-	-
0	11/4/88	INFORMATION ONLY	HB	EWT	HRB	CHL	JLL	MP	JAM VWM

SCALE NONE | DESIGNED RSM | DRAWN VS | DATE 11-4-88

DAVIS-BESSE NUCLEAR POWER STATION UNIT NO 1

OPERATIONAL SCHEMATIC
COMPONENT COOLING WATER SYSTEM

DRAWING NO OS-021 SH 2 | REV 31

DB 07-30-14
DFN= G:\OPSCH\OS21S2.DGN

Admin JPM
RO-A3

Facility: Davis-Besse **Task No:** 000-044-05-0100

Task Title: Calculate Steam Generator Tube Leak Rate

K/A Reference: 2.3.5 (2.9) **Job Performance Measure No**: RO-A3 (JPM 316)

Examinee: _____

NRC Examiner: _____ **Date:** _____

Method of testing:

Simulated Performance ___ Actual Performance _X_

Classroom _X_ Simulator __ Plant ___

Read to the examinee:
I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this job performance measure will be satisfied.

Initial Conditions:
The plant conditions are specified in the Initial Conditions and Initiating Cues.

Task Standard:
Determine SG Tube leak rate

Required Materials:
Calculator

General References:
DB-OP-02531, SG Tube Leaks, Attachment 1, SG Tube Leak Rate calculations
Chemistry Data Sheet

Initiating Cue:
The Initiating Cues are specified in the Examiner/Student Copy Performance Measure pages.

Time Critical Task:
No

Validation Time:
15 minutes

EXAMINER COPY

INITIAL CONDITIONS:

The unit is at 100% power

SG 1 has a tube leak

Pressurizer level is 220 inches and steady

The Computer Calculation for RCS Leakage is NOT available

EO reports Steam Jet Air Ejector flow is 15 scfm

INITIATING CUE:

The Shift Manager directs you to perform a SG Tube Leak calculation using

- DB-OP-02531
- Attachment 1, RCS LEAK RATE CALCULATION
- Section 4, Leak Rate Estimation Using RE 1003A or RE 1003B

Provide the examinee a copy of

- **DB-OP-02531 Attachment 1, RCS Leak Rate Calculation**
- **Pictures of RE 1003A and RE 1003B**
- **Chemistry Data Sheet**

CANDIDATE COPY

INITIAL CONDITIONS:

The unit is at 100% power

SG 1 has a tube leak

Pressurizer level is 220 inches and steady

The Computer Calculation for RCS Leakage is NOT available

EO reports Steam Jet Air Ejector flow is 15 scfm

INITIATING CUE:

The Shift Manager directs you to perform a SG Tube Leak calculation using

- DB-OP-02531
- Attachment 1, RCS LEAK RATE CALCULATION
- Section 4, Leak Rate Estimation Using RE 1003A or RE 1003B

PERFORMANCE INFORMATION

NOTE: Critical steps denoted with a "C". Failure to meet any one of these standards for this item constitutes failure. Sequence is assumed unless denoted in the "Comments".

START TIME:_____

1. PERFORMANCE STEP: Record Date and time

   STANDARD: Correct date and time used

   CUE: **None**

SAT UNSAT

2. PERFORMANCE STEP: Record Steam Jet Air Ejector radiation levels
   .....C.....

   STANDARD: Correctly read RE 1003A (1.02E4 cpm) and RE 1003B (3.97E3 cpm)

   CUE: **None**

SAT UNSAT

3. PERFORMANCE STEP: Convert RE readings (cpm) to µCi/cc
   .....C.....

   STANDARD: Correctly multiply SJAE reading by conversion factor:

   RE 1003A = 6.63E-05 µCi/cc
   RE 1003B = 1.27E-04 µCi/cc

   COMMENT: Acceptable Range

   RE 1003A = 6.6E-05 to 6.7E-05µCi/cc
   RE 1003B = 1.2E-04 to 1.3E-04µCi/cc

   CUE: **None**

SAT UNSAT

4. PERFORMANCE STEP: Record Steam Jet Air Ejector (SJAE) flow from FI1002
.....C.....

STANDARD: Correctly record 15 scfm, as given in the initial cue by an EO

CUE: **None**

SAT UNSAT

---

5. PERFORMANCE STEP: Record the latest RCS Xe-133 activity from Chemistry
.....C.....

STANDARD: Refers to the Chemistry Data Sheet, correctly record RCS Xe-133 activity (6.66E-03 µCi/cc)

CUE: **None**

SAT UNSAT

---

6. PERFORMANCE STEP: Calculate primary-to-secondary tube leak using RE 1003B
.....C.....

STANDARD: Correctly calculate tube leak using RE 1003B (2.14 gpm)

COMMENT: Acceptable Range 2 to 3 gpm

CUE: **None**

SAT UNSAT

TERMINATING CUES: This JPM is complete (Terminated by the examinee)

END TIME_____

CHEMISTRY ANALYSES STATUS

PRIMARY (RCS)			SECONDARY (FEEDWATER)		
Date: Today			Date: Today		
Specification		Value	Specification		Value
≤5	O_2	<2 ppb	≤5	O_2	<2 ppb
≤50	Cl^-	0.73 ppb	≥20	N_2H_4	74 ppb
≤50	F^-	0.94 ppb	≤10	SiO_2	<5 ppb
≤50	SO_4^{-2}	0.19 ppb	≤1	Na^+	0.06 ppb
DBRM-CHEM-0001	Li	1.27 ppm	≤3	Cl^-	0.28 ppb
25 - 50	H_2	37.3 cc/kg	≤1	SO_4^{-2}	<0.064 ppb
≤10	Zinc	4.84 ppb	≤5	Total Iron	0.37 ppb
≤1.0	DEI-131	1.23E-4 µCi/gm	≥2	ETA	2.53 ppm
*2x steady state value	I-131	3.42E-5 µCi/gm	≥6	MPA	7.28 ppm
*Increase of ≥0.01	Xe-133	6.66E-03 µCi/gm	<100	Condensate Dissolved O_2	8.1 ppb
*<1.0	Xe-133/Xe-135 Ratio	0.85	CEI-R (Month): 0.04 CEI-R (Rolling): 0.23		
100/$\bar{E}$	Specific Act.	0.15 µCi/gm	Issues/Challenges: None.		
100/$\bar{E}$	Maximum Limit	913 µCi/gm	Makeup Tank Pressure Band: 30-40 psig		

BORON (PPM)

Vessel	Measured	Effective	**Acceptable Range	Time	Date
RCS	291			0800	10/11/19
PZR	345			1640	10/4/19
BWST	2748	2711	2626 - 2772	0955	10/8/19
BAAT 1	11372	11297	7954 - 12994	0130	10/5/19
BAAT 2	12165	12153	7954 - 12994	0123	9/28/19
CWRT 1	2691	2684	2626-2772	0920	8/27/19
CWRT 2	1149			1730	8/23/18
CFT 1	2916	2903	2626 - 3465	1048	9/19/19
CFT 2	2880	2880	2626 - 3465	1425	9/19/19
SFP	2608	2576	≥630	0820	10/8/19
Refuel Canal	N/A		Per COLR	N/A	N/A

Primary-To-Secondary Leakage

Based on RI-1003: <1.98 gal per day

Based on DB-CH-03031: <5 gal per day

Details for RE1003A/B Equivalent cpm for OTSG leakage are on page 2 of 2

NOTES

* IF any Fuel Integrity Action Level is reached, THEN make notifications in accordance with NOP-NF-1102, Fuel Integrity Monitoring and Assessment.

** Acceptable Range is for Effective boron results and accounts for 1% analysis uncertainty. Effective boron results are corrected for Boron-10 depletion.

Comments:

CHEMISTRY ANALYSES STATUS

RE 1003A/B Equivalent cpm for OTSG Leakage					
Date determined	Today				
Based on RCS Xe-133	6.66E-03 µCi/cc				
Based on FI 1002	15 cfm				
		RE 1003A		**RE 1003B**	
Efficiency used for calculation		6.5E-9	µCi/cc/cpm	3.2E-8	µCi/cc/cpm
5 GPD		1.2E2	cpm	1.5E2	cpm
30 GPD		1.5E2	cpm	1.5E2	cpm
75 GPD		2.0E2	cpm	1.6E2	cpm
150 GPD		2.9E2	cpm	1.8E2	cpm
Increase of 30 GPD		3.5E1	cpm⇑	7.1E0	cpm⇑

Comment: _____

_____

Completed by _____ Date/Time _____/_____

Verified by _____ Date/Time _____/_____

Reviewed by _____ Date/Time _____/_____

Shift Manager