Admin JPM
RO-A1.1

Examinee: _____ **Date:** _____

Examiner: _____

Facility: Davis-Besse **JPM No**: OPS-JPM-316

Task Title: Calculate Steam Generator Tube Leak Rate

Task No: 000-044-05-0100 **System:** _____

K/A Reference: 2.1.19 (3.9) R3 **Safety Function**: _____

Time Critical Task: No **Alternate Path:** _____

Validation Time: 15 minutes

Method of testing:

Simulated Performance ___ Actual Performance _X_

Classroom _X_ Simulator ___ Plant ___

Task Standard:
Determine SG Tube leak rate

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

General References:
None

Notes:
None

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

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 manually calculate the leak rate.
REFER TO DB-OP-02531 R24, STEAM GENERATOR TUBE LEAK

- 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 manually calculate the leak rate.
REFER TO DB-OP-02531 R24, STEAM GENERATOR TUBE LEAK

- 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)

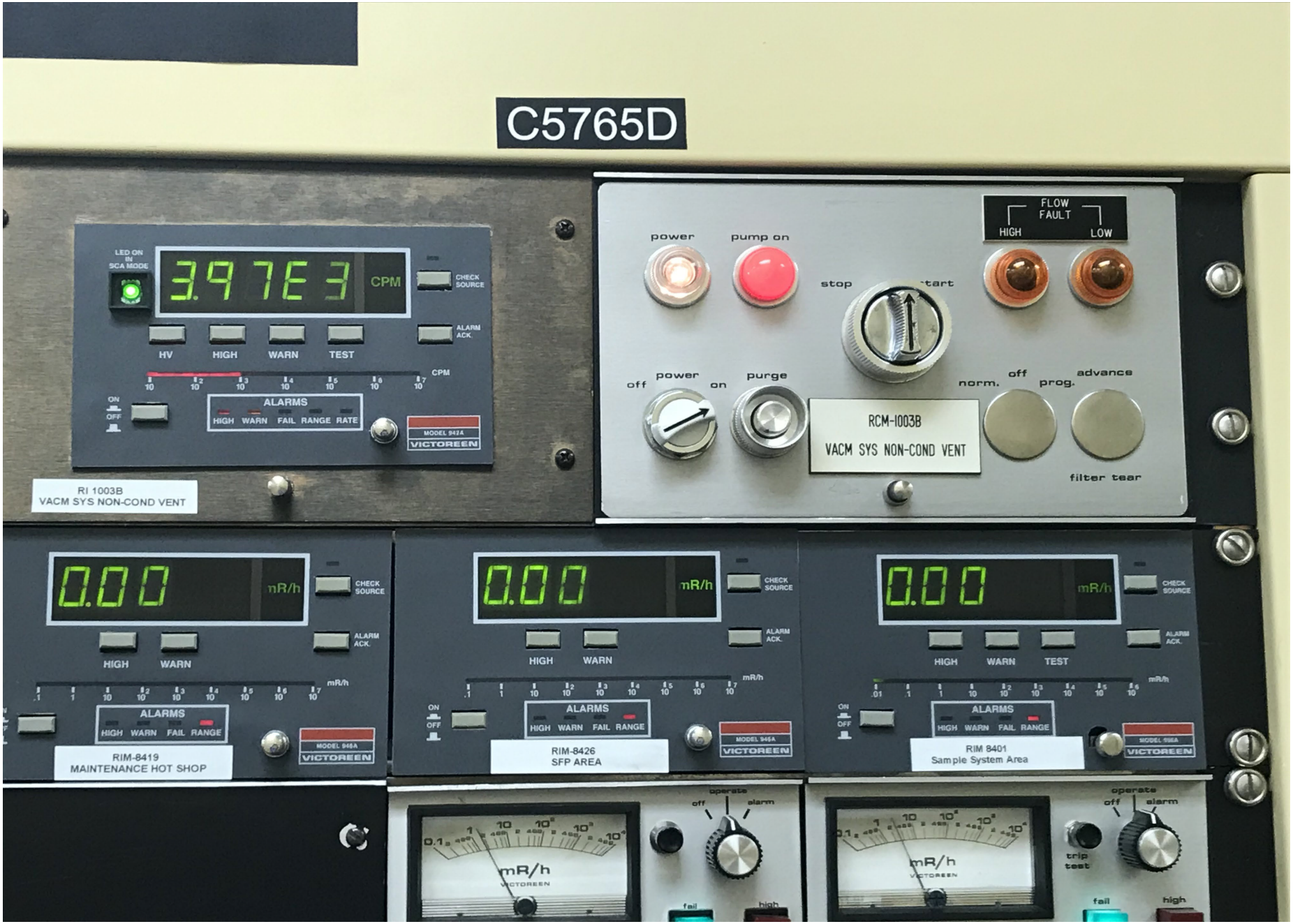
COMMENT: Acceptable Range 2 to 3 gpm

CUE: **None**

SAT UNSAT

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

END TIME_____


C5765D
3.97E3
CPM
CHECK SOURCE
ALARM ACK.
HV
HIGH
WARN
TEST
ALARMS
HIGH WARN FAIL RANGE RATE
MODEL 942A
VICTOREEN
RI 1003B
VACM SYS NON-COND VENT
power
pump on
stop
start
FLOW FAULT
HIGH
LOW
off
power
on
purge
norm.
off
prog.
advance
filter tear
RCM-1003B
VACM SYS NON-COND VENT
0.00
mR/h
HIGH
WARN
ALARMS
HIGH WARN FAIL RANGE
MODEL 946A
RIM-8419
MAINTENANCE HOT SHOP
RIM-8426
SFP AREA
RIM 8401
Sample System Area
operate
off
alarm
fail
high
trip test


C5765B
LED ON IN SCA MODE
1.02E4
CPM
CHECK SOURCE
ALARM ACK.
HV
HIGH
WARN
TEST
CPM
ALARMS
HIGH WARN FAIL RANGE RATE
ON
OFF
MODEL 942A
VICTOREEN
RI 1003A
VACM SYS NON-COND VENT
power
pump on
stop
start
FLOW FAULT
HIGH
LOW
off
power
on
purge
norm.
off
prog.
advance
filter tear
RCM-1003A
VACM SYS NON-COND VENT
1.40E3
RI 5052 A
CTMT PURGE EXHAUST FAN INLET
NORMALLY IN GROSS
5.31E1
RI 5052 B
CTMT PURGE EXHAUST FAN INLET
NORMALLY IN ANALYZE

ATTACHMENT 1: RCS LEAK RATE CALCULATION
Page 1 of 3

NOTE 1

This attachment provides four methods to quickly estimate Reactor Coolant System to Steam Generator leak rate using readily available Control Room indications. This attachment is used if the Computer Calculation for RCS Leakage is not available.

- Section 1, Leak Rate Estimation Using RE1003A, OR 1003B Readings and Chemistry Data.
- Section 2, Leak Rate Estimation Using RCS Inventory Parameters. This method assumes PZR level is relatively constant and Tave is not changing.
- Section 3, Leak Rate Estimation Using Pressurizer and Makeup Tank Level Change – This method will allow leak rate determination when Pressurizer Level is NOT constant.
- Section 4, Leak Rate Estimation Using RE 1003A, OR RE 1003B

To simplify the calculations, errors associated with density corrections, known existing leakage, and other variables are not considered. A more accurate leak rate can be obtained by performing DB-SP-03357, RCS Water Inventory Balance.

_____ 1. Leak Rate Estimation Using RE1003A or RE1003B Readings and Chemistry Data

Compare current RE1003A or RE1003B reading to the Chemistry Data provided table of SG Tube Leakage Rates. Estimate the leak rate based on the readings. Method 4 expands the range of using RE 1003A/B beyond the pre-calculated values provided in the Chemistry Data.

_____ 2. Leak Rate Estimation Using RCS Inventory Parameters

(MU Flow + Seal Injection Flow) – (Letdown Flow + Seal Return Flow) = SGTL Rate

(_____ gpm + _____ gpm) – (_____ gpm + _____ gpm) = _____gpm

ATTACHMENT 1: RCS LEAK RATE CALCULATION
Page 2 of 3

NOTE 3

This leakrate calculation assumes an addition to the Makeup Tank is NOT in progress during the calculation.

_____ 3. Leak Rate Estimation Using Pressurizer and Makeup Tank Level Change

Initial RCS Inventory Conditions Time = _____ hr: min

Pressurizer Level = _____ in

Makeup Tank Level = _____ in

Final RCS Inventory Conditions Time = _____ hr: min

Pressurizer Level = _____ in

Makeup Tank Level = _____ in

Initial RCS Inventory

(30 x Initial MU Tank Level) + (24 x Initial Pressurizer Level) = Initial RCS Inventory

(30 x _____ in) + (24 x _____ in) = _____ gal

Final RCS Inventory

(30 x Final MU Tank Level) + (24 x Final Pressurizer Level) = Final RCS Inventory

(30 x _____ in) + (24 x _____ in) = _____ gal

SG Tube Leak Rate

$$\frac{\text{Initial RCS Inventory - Final RCS Inventory}}{\text{Time Period}} = SGTL\ Rate$$

$$\frac{(\_\_\_\_\_\ gal - \_\_\_\_\_\ gal)}{\_\_\_\_\_\ \text{min}} = \_\_\_\_\_\ \text{gal/min}$$

ATTACHMENT 1: RCS LEAK RATE CALCULATION
Page 3 of 3

_____ 4.0 Leak Rate Estimation Using RE 1003A or RE 1003B

(a.)	Record the date and time. Date _____ Time _____	
(b.)	Record Xe-133 activity from the Steam Jet Air Ejector (SJAE) monitors	RE1003A reading_____CPM RE1003B reading_____CPM
(c.)	SJAE activity - convert CPM to µCi/cc Xe-133; (RE1003A, from (b.)_____CPM) (6.5 E-9)=_____µCi/cc (RE1003B, from (b.)_____CPM) (3.2 E-8)=_____µCi/cc	
(d.)	Record SJAE flow from FI1002 (must be greater than 0)	_____FT³/MIN
(e.)	Record the latest Xe-133 concentration in the Reactor Coolant System from Chemistry.	_____µCi/cc
(f.)	Using the highest value from (c.), calculate the primary to secondary tube leak as follows: $L.R. = \frac{7.48 \frac{GAL}{FT^3} (\text{Step c.})(\text{Step d.})}{(\text{Step e.})}$	$\frac{7.48 \frac{GAL}{FT^3} (____)(____)}{(____)} = ____$GPM

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 Issues/Challenges: None.			
100/$\bar{E}$	Specific Act.	0.15	µCi/gm				
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.

CHEMISTRY ANALYSES STATUS

Comments:

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

ATTACHMENT 1: RCS LEAK RATE CALCULATION
Page 1 of 3

NOTE 1

This attachment provides four methods to quickly estimate Reactor Coolant System to Steam Generator leak rate using readily available Control Room indications. This attachment is used if the Computer Calculation for RCS Leakage is not available.

- Section 1, Leak Rate Estimation Using RE1003A OR 1003B Readings and Chemistry Data.
- Section 2, Leak Rate Estimation Using RCS Inventory Parameters - This method assumes PZR level is relatively constant and Tave is not changing.
- Section 3, Leak Rate Estimation Using Pressurizer and Makeup Tank Level Change – This method will allow leak rate determination when Pressurizer Level is NOT constant.
- Section 4, Leak Rate Estimation Using RE 1003A OR RE 1003B

To simplify the calculations, errors associated with density corrections, known existing leakage, and other variables are not considered. A more accurate leak rate can be obtained by performing DB-SP-03357, RCS Water Inventory Balance.

N/A 1. Leak Rate Estimation Using RE1003A or RE1003B Readings and Chemistry Data

Compare current RE1003A or RE1003B reading to the Chemistry Data provided table of SG Tube Leakage Rates. Estimate the leak rate based on the readings. Method 4 expands the range of using RE 1003A/B beyond the pre-calculated values provided in the Chemistry Data.

N/A 2. Leak Rate Estimation Using RCS Inventory Parameters

(MU Flow + Seal Injection Flow) – (Letdown Flow + Seal Return Flow) = SGTL Rate

(_____ gpm + _____ gpm) – (_____ gpm + _____ gpm) = _____gpm

ATTACHMENT 1: RCS LEAK RATE CALCULATION
Page 2 of 3

NOTE 3

This leakrate calculation assumes an addition to the Makeup Tank is NOT in progress during the calculation.

N/A 3. Leak Rate Estimation Using Pressurizer and Makeup Tank Level Change

Initial RCS Inventory Conditions Time = _____ hr: min

Pressurizer Level = _____ in

Makeup Tank Level = _____ in

Final RCS Inventory Conditions Time = _____ hr: min

Pressurizer Level = _____ in

Makeup Tank Level = _____ in

Initial RCS Inventory

(30 x Initial MU Tank Level) + (24 x Initial Pressurizer Level) = Initial RCS Inventory

(30 x _____ in) + (24 x _____ in) = _____ gal

Final RCS Inventory

(30 x Initial MU Tank Level) + (24 x Initial Pressurizer Level) = Final RCS Inventory

(30 x _____ in) + (24 x _____ in) = _____ gal

SG Tube Leak Rate

$$\frac{\text{Initial RCS Inventory - Final RCS Inventory}}{\text{Time Period}} = SGTL\ Rate$$

$$\frac{(\_\_\_\_\_\ gal - \_\_\_\_\_\ gal)}{\_\_\_\_\_\ min} = \_\_\_\_\_\ \text{gal/min}$$

ATTACHMENT 1: RCS LEAK RATE CALCULATION
Page 3 of 3

RO (4.0) Leak Rate Estimation Using RE 1003A or RE 1003B

(a.)	Record the date and time. Date Today	Time Now
(b.)	Record Xe-133 activity from the Steam Jet Air Ejector (SJAE) monitors	RE1003A reading 1.02E4 CPM RE1003B reading 3.97E3 CPM
(c.)	SJAE activity - convert CPM to µCi/cc Xe-133; (RE1003A, from (b.) 1.02E4 CPM) (6.5 E-9)= 6.63E-5 µCi/cc (RE1003B, from (b.) 3.97E3 CPM) (3.2 E-8)= 1.27E-4 µCi/cc	
(d.)	Record SJAE flow from FI1002 (must be greater than 0)	15 FT³/MIN
(e.)	Record the latest Xe-133 concentration in the Reactor Coolant System from Chemistry.	6.66E-3 µCi/cc
(f.)	Using the highest value from (c.), calculate the primary to secondary tube leak as follows: $L.R. = \frac{7.48 \frac{GAL}{FT^3} \text{ (Step c.)(Step d.)}}{\text{(Step e.)}}$	$\frac{7.48 \frac{GAL}{FT^3} (1.27E^{-4})(15)}{(6.66E^{-3})} = 2.14$ GPM

Admin JPM
RO-A1.2

Examinee: _____ **Date:** _____

Examiner: _____

Facility: Davis-Besse **JPM No**: OPS-JPM-276

Task Title: Perform 1/M Plot

Task No: 115-033-01-0100 **System:** _____

K/A Reference: 2.1.43 (4.1) **Safety Function:** _____

Time Critical Task: No **Alternate Path:** _____

Validation Time: 15 minutes

Method of testing:

Simulated Performance ___ Actual Performance __X__

Classroom __X__ Simulator ___ Plant ___

Task Standard:
Perform the calculations and 1/M Plot and recommend no further rod withdrawal.
Also, acceptable to recommend inserting Control Rod Groups 2-7

Required Materials:
DB-OP-06912 R22, Approach to Criticality
Straight edge
Calculator

General References:
None

Notes:
None

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

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

EXAMINER COPY

INITIAL CONDITIONS:

The Plant is in Mode 2.
A reactor startup is in progress.
Group 1-4 rods are withdrawn
Regulating Rods are pulled to 100 Rod Index

INITIATION CUE:

The Shift Manager directs you to perform a peer check of the Reactor Engineer performing the 1/M Plot by performing a separate 1/M Plot using the Source Range count rate data provided on Attachment 1 of DB-OP-06912, Approach to Criticality.

- Compare the 1/M data with the predicted ECP data
- Make a recommendation for further rod withdrawal.

Document recommendation below.

(Hand Candidate a copy of DB-OP-06912, Approach to Criticality, Calculator, and a Straight Edge)

CANDIDATE COPY

INITIAL CONDITIONS:

The Plant is in Mode 2.
A reactor startup is in progress.
Group 1-4 rods are withdrawn
Regulating Rods are pulled to 100 Rod Index

INITIATION CUE:

The Shift Manager directs you to perform a peer check of the Reactor Engineer performing the 1/M Plot by performing a separate 1/M Plot using the Source Range count rate data provided on Attachment 1 of DB-OP-06912, Approach to Criticality.

- Compare the 1/M data with the predicted ECP data
- Make a recommendation for further rod withdrawal

Document recommendation 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 required unless denoted in the "Comments".

START TIME: _____

1. PERFORMANCE STEP: Refer to data on Attachment 1

   STANDARD: Refer to data on Attachment 1 for count rate data

   CUE: **None**

SAT UNSAT

---

2. PERFORMANCE STEP: Plots data SR data on 1/M Plot
   .....C.....

   STANDARD: Evaluates count rate data on attachment 1 and plots this data on the 1/M Plot for 25, 50, 75, and 100 Rod Index

   COMMENTS: Calculated 1/M values are critical
   25: .92
   50: .76
   75: .52
   100: .16

   Predicted Critical Positions on Answer Key are not critical

   CUE: **None**

SAT UNSAT

---

3. PERFORMANCE STEP: Evaluate 1/M Plot data
   .....C.....

   STANDARD:
   - Plot the 1/M by connecting the last two data points on the graph and extending the line down to meet the horizontal (Rod index) axis.
   - Determines that the 1/M Plot predicts criticality before reaching the Lower Rod Index limit of the ECP listed as 125 (- 0.5%Δk/k)

   CUE: **None**

SAT UNSAT

---

4. PERFORMANCE STEP: **.....C.....** Notify SRO that the 1/M Plot predicts criticality before reaching the Lower Rod Index limit of the ECP and recommend no further rod withdrawal.

   STANDARD: Notify SRO that the 1/M Plot predicts criticality before reaching the Lower Rod Index limit of the ECP and recommend no further rod withdrawal.

   May also recommend inserting Control Rod Groups 2-7.

   CUE: **None – Verify that the candidate makes the recommendation for no further rod withdrawal or ask a follow-up question.**

SAT UNSAT

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

END TIME: _____

Davis-Besse Nuclear Power Station

PLANT PROCEDURE

DB-OP-06912

APPROACH TO CRITICALITY

REVISION 23

TRAINING COPY	
VERIFIED CURRENT	
Initial/Date	Initial/Date
Ro / Today	

Prepared by: Debra Little

Procedure Owner: Assistant Nuclear Operations Manager, Support

Effective Date: 06/16/23

LEVEL OF USE:

STEP-BY-STEP

APPROACH TO CRITICALITY

TABLE OF CONTENTS

1.0 PURPOSE

This procedure describes the steps necessary to take the Reactor from HOT STANDBY to a stable power level of approximately $1x10^{-8}$ AMPS on the Intermediate Range Nuclear Instrumentation.

This procedure shall be followed anytime the Reactor is taken critical, with the exception of the first criticality following a change in core configuration. This first criticality will be directed by DB-NE-03212, Zero Power Physics Testing. DB-NE-03212, Zero Power Physics Testing, may direct the use of this procedure to take the reactor critical.

2.0 LIMITS AND PRECAUTIONS

2.1 Administrative

2.1.1 MODE 2 shall be declared no sooner than when all 4 Safety Groups are fully withdrawn and no later than achieving keff of 0.99 %Δk/k. Declaration of MODE 2 just prior to withdrawal of Regulating Groups is a conservative action which ensures the MODE is entered with the appropriate plant configuration to meet the Applicability of Tech Spec 3.1.5 and 3.2.1.

2.1.2 The maximum startup rate with no rod motion out is 0.5 decade per minute (DPM). The maximum startup rate during control rod withdrawal is 1.0 DPM. If unexplained high startup rates are observed, immediately insert control rods to reduce the startup rate and refer to step 2.1.3.

2.1.3 Control Rod Groups 2-7 shall be inserted if any of the following occurs:

- High unexplained Startup Rate (see step 2.1.2),
- Any condition that physically or administratively delays criticality by more than 1 hour (Actively complying with the requirements of this procedure (such as step 2.1.14) is not a delay. The Shift Manager is responsible for determining what constitutes a delay.),
- Any Control Rod(s) is dropped.

2.1.4 The following conditions must exist prior to deborating the Reactor Coolant System (RCS) to the Estimated Critical Boron (ECB) concentration:

- Control Rod Group 1 withdrawn to the OUT LIMIT (to provide trippable negative reactivity),
- Tave is approximately 532°F.

2.1.5 Operators shall anticipate criticality any time Control Rods are being withdrawn or the RCS is being deborated.

2.1.6 Conservative actions and strict compliance with this procedure is required during any evolution that alters reactivity conditions. If at any time an unanticipated or abnormal change in reactivity (count rate) occurs, the RCS shall be borated and/or control rods inserted. Borate as necessary to establish or maintain regulating rod insertion limits and SDM within the limits specified in the COLR.

2.1.7 Control rods shall not be withdrawn in an attempt to restore RCS temperature following a plant transient resulting in an RCS temperature reduction.

2.1.8 During the approach to criticality, plant activities (such as telephone calls and surveillance testing) that have the potential for distracting Control Room personnel involved with the reactor startup from their primary duties are not allowed. Other activities (such as turnover) may be allowed as determined by the Shift Manager.

2.1.9 During the performance of this procedure, alternate indications of reactivity and power shall be compared. If indications do not track as expected, the Control Room SRO shall be notified. Items available for comparison include:

- 1/M plot
- Source Range Startup Rate on NYINI1 and NYINI2
- Source Range counts on NI5874A (C5799), NI5875A (C5798), NINI1, and NINI2
- Intermediate Range Log N AMPS on NINI3, NINI4, and NRNI4
- Intermediate Range Startup Rate on NYINI3 and NYINI4
- Neutron Flux Wide Range NI5874B (C5799) and NI5875B (C5798)

2.1.10 During the performance of this procedure, the SGs shall be maintained on Low Level Limits. Maintaining low level limits will meet the assumptions in the steam line break analysis.

2.1.11 The following TSs and surveillance requirements and TRM Technical Verification Requirements are addressed during an approach to criticality:

- Shutdown Margin shall be within the limits specified in the COLR (TS 3.1.1, MODES 3, 4, 5) and must be verified within 4 hours prior to achieving criticality (SR 3.2.1.3).
- Each loop average temperature shall be ≥ 525°F whenever the Reactor is critical (TS 3.4.2).
- At least 1 decade of overlap shall exist between the Source Range and Intermediate Range Nuclear Instruments. (TVR 8.3.10.1)
- Regulating Rods shall be within the physical insertion, sequence and overlap limits specified in the COLR. (TS 3.2.1)
- Verify each safety rod is fully withdrawn (SR 3.1.5.1).

2.1.12 To ensure all safety rods are fully withdrawn prior to MODE 2, the minimum estimated critical rod position shall be greater than 1.0 %Δk/k above the reactivity at 0 Rod Index (RI). The desired RI should be greater than 1.5%Δk/k above the reactivity at 0 RI to ensure that a margin exists between all safety rods being fully withdrawn (prior to keff ≥ .99) and criticality (keff = 1).

2.1.13 Control Rod Groups 2-7 shall be inserted if the Reactor Engineer determines criticality would be achieved at ≥ 1.0%Δk/k of the Estimated Critical Position (ECP). A Condition Report will be written and evaluated prior to continuing.

2.1.14 Control Rod Groups 2-7 shall be inserted if the Reactor Engineer determines criticality would be achieved at > 0.5%Δk/k, but < 1.0%Δk/k, of the ECP. After a re-review of the ECP and associated inputs, the appropriate Boron concentration adjustment will be completed, and the approach to criticality will be re-initiated. A Condition Report will be written for future evaluation of the exceedance of 0.5%Δk/k.

2.1.15 Control rods will be inserted to 150 RI if criticality is not achieved during rod withdrawal, and the Reactor Engineer determines the amount of positive reactivity required is < 0.5%Δk/k. After a re-review of the ECP and associated inputs, the appropriate Boron concentration adjustment will be completed, and the approach to criticality will be re-initiated from 150 RI.

2.1.16 Section 4.1, Beginning of Cycle Startup is intended to only be used with the first start-up of the cycle IAW DB-NE-03212. Section 4.2, Middle of Cycle Startup is intended to be used for any start-up except the first of the cycle IAW DB-OP-06901.

2.2 Equipment

2.2.1 CRD travel is limited to 420 inches in one hour.

3.0 DETERMINATION OF DESIRED CRITICAL CONFIGURATION

Prerequisites

None

Procedure

NOTE 3.1 to 3.3

The Desired Critical Rod Index will be determined by the START program as a function of Transient Poison Worth if an Operator-selected Rod Index is not entered into the ECB routine.

The APSR position must be entered into the ECB routine. Unless otherwise specified by a Reactor Engineer, the APSR position will be the same as the last time the reactor was at full power.

The Desired Critical Rod Index assumed in the START Program ECB routine might not satisfy the requirements of Limit and Precaution 2.1.12 and CAUTION 3.1.

CAUTION 3.1

To ensure all safety rods are fully withdrawn prior to MODE 2, the minimum estimated critical rod position shall be greater than 1.0 %Δk/k above the reactivity at 0 Rod Index (RI). The desired RI should be greater than 1.5%Δk/k above the reactivity at 0 RI to ensure that a margin exists between all safety rods being fully withdrawn (prior to keff ≥ .99) and criticality (keff = 1).

3.1 Determine the ECB concentration using one of the following methods:

RO 3.1.1 ECB routine in the START program displayed on the IPC Desktop.

N/A 3.1.2 ECB Calculation performed by Reactor Engineering.

N/A 3.1.3 DB-NE-06202, Reactivity Balance Calculation.

RO 3.2 Attach the ECB printout from the START program, ECB Calculation supplied by Reactor Engineering, or the ECB Worksheet from DB-NE-06202, Reactivity Balance Calculation, to this procedure.

3.3 IF the START program or DB-NE-06202, Reactivity Balance Calculation, is available, THEN a licensed member of the shift performing the startup shall independently determine the ECB using one of the following methods:

RO 3.3.1 ECB routine in the START program displayed on the IPC Desktop.

N/A 3.3.2 DB-NE-06202, Reactivity Balance Calculation.

RO 3.4 Attach the ECB printout from the START program or the ECB Worksheet from DB-NE-06202, Reactivity Balance Calculation, to this procedure.

RO 3.5 The Reactor Engineer shall reconcile differences in results and determine the ECB to be used.

Section 3.0 completed by RO Date Today

4.0 ESTABLISHING CRITICALITY

4.1 BEGINNING OF CYCLE STARTUP

Prerequisites

_____ 4.1.1 Verify the Desired Critical Configuration has been determined by completing Section 3.0 of this procedure.

_____ 4.1.2 Verify a unit startup has proceeded to the point requiring an Approach to Criticality. REFER TO DB-OP-06901, Plant Startup.

4.1.3 Verify the following plant conditions and actions have been established:

_____ • Unit is in Mode 3 with Tave at 532°F ± 2°F.

_____ • CRD Safety Group 1 is 100 percent withdrawn and at the OUT LIMIT.

_____ • Verify completion of prerequisites for Control Rod withdrawal for Reactor Startup of DB-OP-06402, CRD Operating Procedure.

_____ • SP7A AND SP7B, SG STARTUP FEEDWATER CONTROLS are in AUTO.

NOTE 4.1.3. •

Past RCS Tave instabilities have been attributed to the Turbine Bypass Valves (TBVs) momentarily closing with the turbine reset introducing the 50 psi header bias. With two TBVs per Main Steam Line isolated, demand for the in-service TBV will be higher and prevent momentary closures. Refer to ATL-2019-0208-ATA-03 for additional information.

_____ • The Main Turbine is tripped OR the desired TBV configuration has been established to minimize RCS Tave fluctuations.

4.1.4 Verify the following plant conditions and actions have been established:

_____ • Pressurizer Boron should be within 30 PPMB of RCS Boron, OR the Shift Manager and Reactor Engineer have determined that sampling is NOT required.

_____ • Makeup Tank Boron should be within 30 PPMB of RCS Boron AND within 30 PPMB of Pressurizer Boron OR the Shift Manager and Reactor Engineer have determined that sampling is NOT required.

_____ c. WHEN Group 6 Rod Control Panel CONTROL ON light is OFF,
AND Group 6 Rod Control Panel OUT LIMIT light is ON,
AND Group 6 Rod Control Panel OUT LIMIT light is ON,
Group 7 API average on the PIP is within 20 to 30%:

(100 - Group 6 API average) + (Group 7 API average) = overlap

(100 - _____) + (_____) = _____

_____
IV

Calculation Independent Verification completed by _____ Date _____

_____ d. Document in the Unit Log that rod groups 6 and 7 are within the overlap limits specified in the COLR (SR 3.2.1.1).

_____ 4.1.37 GO TO DB-NE-03212, Zero Power Physics Testing,
AND attach this procedure to the working copy of DB-NE-03212, Zero Power Physics Testing.

Section 4.1 completed by _____ Date _____

4.2 MIDDLE OF CYCLE STARTUP

Prerequisites

RO 4.2.1 Verify the Desired Critical Configuration has been determined by completing Section 3.0 of this procedure.

RO 4.2.2 Verify a unit startup has proceeded to the point requiring an Approach to Criticality.
REFER TO DB-OP-06901, Plant Startup.

4.2.3 Verify the following plant conditions and actions have been established:

RO • Unit is in Mode 3 with Tave at 532°F ± 2°F.

RO • CRD Safety Group 1 is 100 percent withdrawn and at the OUT LIMIT.

RO • Verify completion of prerequisites for Control Rod withdrawal for Reactor Startup of DB-OP-06402, CRD Operating Procedure.

RO • SP7A AND SP7B, SG STARTUP FEEDWATER CONTROLS are in AUTO.

NOTE 4.2.3 •

Past RCS Tave instabilities have been attributed to the Turbine Bypass Valves (TBVs) momentarily closing with the turbine reset introducing the 50 psi header bias. With two TBVs per Main Steam Line isolated, demand for the in-service TBV will be higher and prevent momentary closures. Refer to ATL-2019-0208-ATA-03 for additional information.

RO • Based on current plant conditions, the Main Turbine is tripped OR the desired TBV configuration has been established to minimize RCS Tave fluctuations.

4.2.4 Verify the following plant conditions and actions have been established:

RO • Pressurizer Boron should be within 30 PPMB of RCS Boron,
OR the Shift Manager and Reactor Engineer have determined that sampling is NOT required.

RO • Makeup Tank Boron should be within 30 PPMB of RCS Boron
AND within 30 PPMB of Pressurizer Boron
OR the Shift Manager and Reactor Engineer have determined that sampling is NOT required.

RO ✓ The average RCS Boron concentration from three samples drawn at greater than or equal to 15 minute intervals is within 30 PPMB of the ECB,
OR the Shift Manager and Reactor Engineer have evaluated any deviation in the three sample results as acceptable:

RCS Boron (ppmB)	1720	1721	1720
Date	Today	Today	Today
Time	T	T+15min	T+30min

Average RCS Boron concentration = Sum of Samples/3 = 1720.3 ppmb

RO ~~4.2.5~~ Verify a Reactor Engineer and Shift Engineer are in the Control Room prior to withdrawing Control Rod Groups 2 through 7.

RO ~~4.2.6~~ Verify no personnel are in containment by contacting CAS and RP.

RO ~~4.2.7~~ Verify the Shift Manager is in the Control Room.

Prerequisites completed by RO Date Today

Procedure

4.2.8 IF the current APSR position is different than the APSR position used for the ECB calculation,
THEN perform the following:

N/A a. Record the initial count rate data with Control Rod Group 1 fully withdrawn below.

Initial Count Rate _____ CPS (NI- _____)

b. IF at any time during positioning of the APSRs, any of the following conditions occur:

- It becomes apparent that criticality will be established,
- Startup Rate is excessive or unexplained,

THEN restore the APSRs to their original position
AND REFER TO Technical Specification 3.1.1, 3.2.2.

N/A c. Position the APSRs to the position used for the ECB calculation.
REFER TO DB-OP-06402, CRD Operating Procedure.

NOTE 4.2.9 to 4.2.11

a. The Critical Rod Position is dependent on transient poison worth and consequently changes with time. The only variable entered in the ECP by the operator is APSR position, unless directed by a Reactor Engineer. The APSR position will not normally change since the last time the Reactor was critical.

b. The Critical Rod Position should be greater than 1.5%Δk/k above the reactivity at 0 RI (Limit and Precaution 2.1.12).

4.2.9 Determine the Critical Rod Position using one of the following methods:

N/A a. ECP routine in the START program on the IPC Desktop.

RO b. ECP calculation performed by Reactor Engineering.

N/A c. DB-NE-06202, Reactivity Balance Calculations.

RO 4.2.10 Attach the ECP printout from the START program, ECP Calculation supplied by Reactor Engineering, or the ECP Worksheet from DB-NE-06202, Reactivity Balance Calculation, to this procedure.

RO 4.2.11 IF the START program or DB-NE-06202, Reactivity Balance Calculation, is available,
THEN a licensed member of the shift performing the startup shall independently determine the ECP using one of the following methods:

RO a. ECP routine in the START program displayed on the IPC Desktop.

N/A b. DB-NE-06202, Reactivity Balance Calculation.

RO 4.2.12 Attach the ECP printout from the START program or the ECP Worksheet from DB-NE-06202, Reactivity Balance Calculation, to this procedure.

RO 4.2.13 The Reactor Engineer shall reconcile differences in results and determine the ECP to be used.

RO 4.2.14 Verify Control Rod Safety Groups 2 through 4 are latched and the associated Relative Position Indicators are reset.
REFER TO DB-OP-06402, CRD Operating Procedure.

RO 4.2.15 Notify Chemistry to establish a purge flow path for RCS Boron samples.

RO 4.2.16 Using the plant paging system, notify all station personnel that a Reactor startup is in progress and to refrain from making non-emergency calls to the Control Room.

NOTE 4.2.17

- Steps 4.2.17 through 4.2.25 should be read in their entirety before withdrawing Control Rods.
- The rod withdrawal sequence may be stopped at any time to evaluate conditions, including updating 1/M Plots.

RO 4.2.17 Notify the Reactor Engineer to begin performing a plot of 1/M vs. Positive Reactivity Added.

NOTE 4.2.18

To avoid excessive cycling of control rods, Safety Groups 2 through 4 should not be withdrawn unless criticality is expected to be established within 1 hour.

DB-OP-06402, CRD Operating Procedure, provides instructions for Control Rod withdrawal for Reactor Startup.

CAUTION 4.2.18

Criticality should be anticipated any time during rod withdrawal. The time to achieve a stable count-rate increases as criticality is approached. Criticality is indicated by the following:

Continually increasing count rate with no rod motion.

Sustained positive startup rate with no rod motion.

4.2.18 Withdraw Control Rod Safety Groups 2 through 4 as follows:

RO a. Record the initial count rate data with Control Rod Group 1 fully withdrawn below.

Initial Count Rate 150 CPS (NI- 2)

N/A b. IF at any time during pulling of Safety Rod Groups 2 through 4, any of the following conditions occur:

- It becomes apparent that criticality will be established,
- Entry into MODE 2 (Keff ≥ .99),
- Any Control Rod is dropped,
- Startup Rate is excessive or unexplained,

THEN insert Control Rod Groups 2-4
AND REFER TO
Technical Specifications 3.1.1, 3.1.4 and 3.1.5.

RO c. Withdraw Control Rod Group 2 to the OUT LIMIT.
REFER TO DB-OP-06402, CRD Operating Procedure, Control Rod withdrawal for Reactor Startup.

RO (d) Verify with the Reactor Engineer the Reactor is not predicted to go critical on the withdrawal of Group 3 based on 1/M Plot data.

RO (e) Withdraw Control Rod Group 3 to the OUT LIMIT.
REFER TO DB-OP-06402, CRD Operating Procedure, Control Rod withdrawal for Reactor Startup.

RO (f) Verify with the Reactor Engineer the Reactor is not predicted to go critical on the withdrawal of Group 4 based on 1/M Plot data.

RO (g) Withdraw Control Rod Group 4 to the OUT LIMIT.
REFER TO DB-OP-06402, CRD Operating Procedure, Control Rod withdrawal for Reactor Startup.

RO (h) WHEN the Source Range counts rate has stabilized,
THEN update the 1/M plot(s).

NOTE 4.2.19
Since exact entry point into MODE 2 is difficult to determine, entry will be documented prior to withdrawal of Control Rod Group 5.

RO 4.2.19 Record entry into MODE 2 in the Unit Log.

RO 4.2.20 Verify Control Rod Regulating Groups 5 through 7 are latched and the associated Relative Position Indicators are reset.
REFER TO DB-OP-06402, CRD Operating Procedure.

NOTE 4.2.21
- If any condition, physically or administratively delays criticality, the Reactor shall be maintained adequately shutdown through compliance with TS 3.1.1, 3.1.5 and 3.2.1.
- Actively complying with the requirements of this procedure (such as step 2.1.14) is not a delay.
- The Shift Manager is responsible for determining what constitutes a delay.

4.2.21 IF estimated time of criticality has been delayed by more than 1 hour, OR if Regulating Rod withdrawal is expected to be delayed by more than 1 hour from the time Control Rod Groups 2 through 4 were withdrawn, THEN perform the following

N/A a. Declare MODE 3.

| b. Insert Control Rod Groups 4 through 2, REFER TO DB-OP-06402, CRD Operating Procedure.

N/A c. N/A the remainder of this procedure.

NOTE 4.2.22

This is accomplished by verifying the desired critical rod position is within the rod insertion limits of the COLR.

RO 4.2.22 Verify the SHUTDOWN MARGIN is within the limits specified in the Core Operating Limits Report per SR 3.2.1.3 within 4 hours prior to achieving criticality,
AND logged in the Unit Log.

_____ 4.2.23 IF at any time during the approach to criticality, or power escalation to $1x10^{-8}$ AMPS, any of the following conditions occur:

- Any condition physically or administratively delays criticality by more than 1 hour (Actively complying with the requirements of this procedure, such as step 2.1.15, is not a delay. The Shift Manager is responsible for determining what constitutes a delay.),
- Any Control Rod(s) is dropped,
- The RCS boron concentration is less than the ECP by more than 10 ppmB,
- Startup Rate is excessive (see step 2.1.2) or unexplained,
- It becomes apparent that criticality will occur before reaching the Lower Rod Index limit of the ECP (-0.5%Δk/k) (steps 2.1.13 and 2.1.14),
- The Upper Rod Index limit of the ECP (+0.5%Δk/k) is reached without going critical (steps 2.1.13 and 2.1.14),

THEN insert Control Rod Groups 2-7.

NOTE 4.2.24

Attachment 2 will be referred to during the withdrawal of each Regulating Group.

RO 4.2.24 Detach Attachment 2, Rod Control and Sequence Operation Notes.

NOTE 4.2.25

Step 4.2.25 should be read in its entirety before withdrawing Regulating Rods.

The rod withdrawal sequence may be stopped at any time to evaluate conditions, including updating 1/M Plots.

CAUTION 4.2.25

Criticality should be anticipated any time during rod withdrawal. Criticality is indicated by the following:

Continually increasing count rate with no rod motion.

Sustained positive startup rate with no rod motion.

4.2.25 Withdraw the Regulating Control Rods to establish criticality as follows:

NOTE 4.2.25.a

Alternate indications for comparison during an approach to criticality are listed in Limit and Precaution 2.1.9.

_____ a. Compare alternate indications during the approach to criticality to detect the potential of premature criticality due to instrument errors or invalid estimated critical conditions calculations.

NOTE 4.2.25.b

The Reactor Engineer may use a 1/M vs. Positive Reactivity Added Method of plotting.

b. Continue performing Attachment 1, 1/M Plot:

_____ 1. The Reactor Engineer,
AND the Shift Engineer or others as directed by the Shift Manager will perform the 1/M plot.

RO c. The Reactor Engineer using the 1/M Plot data has predicted the reactor (circle the response)

IS LIKELY TO IS NOT LIKELY TO

go critical prior to completion of the next specified rod withdrawal to 25 Rod Index.

RO d. Review Attachment 2, Rod Control and Sequence Operation Notes.

CAUTION 4.2.25.e

Criticality should be anticipated any time during rod withdrawal.

e. Simultaneously perform the following:

RO 1. Withdraw the Regulating Rods to 25 Rod Index,

RO 2. Limit the maximum Startup Rate to 0.5 dpm with no rod motion,

RO 3. Limit the maximum Startup Rate to 1.0 dpm with rod motion,

RO 4. Monitor for criticality.

N/A 5. IF criticality is achieved,
THEN GO TO Step 4.2.25.ww.

RO f. WHEN the count rate has stabilized,
THEN update the 1/M plot(s).

RO g. The Reactor Engineer using the 1/M Plot data has predicted the reactor (circle the response)

IS LIKELY TO IS NOT LIKELY TO

go critical prior to completion of the next specified rod withdrawal to 50 Rod Index.

CAUTION 4.2.25.h

Criticality should be anticipated any time during rod withdrawal.

j. Simultaneously perform the following:

RO Withdraw the Regulating Rods to 50 Rod Index,

RO Limit the maximum Startup Rate to 0.5 dpm with no rod motion,

RO Limit the maximum Startup Rate to 1.0 dpm with rod motion,

RO Monitor for criticality.

N/A IF criticality is achieved,
THEN GO TO Step 4.2.25.ww.

RO i. WHEN the count rate has stabilized,
THEN update the 1/M plot(s).

RO i. The Reactor Engineer using the 1/M Plot data has predicted the reactor (circle the response)

IS LIKELY TO IS NOT LIKELY TO

go critical prior to completion of the next specified rod withdrawal to 75 Rod Index.

CAUTION 4.2.25.k

Criticality should be anticipated any time during rod withdrawal.

k. Simultaneously perform the following:

RO Withdraw the Regulating Rods to 75 Rod Index,

RO Limit the maximum Startup Rate to 0.5 dpm with no rod motion,

RO Limit the maximum Startup Rate to 1.0 dpm with rod motion,

RO Monitor for criticality.

N/A IF criticality is achieved,
THEN GO TO Step 4.2.25.ww.

RO l. WHEN the count rate has stabilized,
THEN update the 1/M plot(s).

RO m. The Reactor Engineer using the 1/M Plot data has predicted the reactor (circle the response)

IS LIKELY TO IS NOT LIKELY TO

go critical prior to completion of the next specified rod withdrawal to 100 Rod Index .

RO n. Review Attachment 2, Rod Control and Sequence Operation Notes.

NOTE 4.2.25.o

100 Rod Index corresponds to 87.5% on Group 5 and 12.5% on Group 6.

CAUTION 4.2.25.o

Criticality should be anticipated any time during rod withdrawal.

o. Simultaneously perform the following:

RO Withdraw the Regulating Rods to 100 Rod Index,

RO Limit the maximum Startup Rate to 0.5 dpm with no rod motion,

RO Limit the maximum Startup Rate to 1.0 dpm with rod motion,

RO Monitor for criticality.

N/A IF criticality is achieved,
THEN GO TO Step 4.2.25.ww.

RO p. WHEN the count rate has stabilized,
THEN update the 1/M plot(s).

_____ q. The Reactor Engineer using the 1/M Plot data has predicted the reactor (circle the response)

IS LIKELY TO IS NOT LIKELY TO

go critical prior to completion of the next specified rod withdrawal to 125-127 Rod Index.

_____ r. Review Attachment 2, Rod Control and Sequence Operation Notes.

CAUTION 4.2.25.s

Criticality should be anticipated any time during rod withdrawal.

s. Simultaneously perform the following:

_____ • Without exceeding 127 Rod Index (Group 6 27% WD), Withdraw the Regulating Rods until Group 5 CONTROL ON lights go OFF,

_____ • Limit the maximum Startup Rate to 0.5 dpm with no rod motion,

_____ • Limit the maximum Startup Rate to 1.0 dpm with rod motion,

_____ • Monitor for criticality.

_____ • IF criticality is achieved,
THEN GO TO Step 4.2.25.ww.

_____ • IF Group 5 CONTROL ON lights go OFF prior to the Rod Control Panel Group 5 OUT LIMIT being reached,
THEN REFER TO DB-OP-06402, CRD Operating Procedure, to obtain 100 PERCENT and OUT LIMIT lights for all rods in a group.

_____ • WHEN Group 5 Rod Control Panel CONTROL ON light is OFF,
AND Group 5 Rod Control Panel OUT LIMIT light is ON,
THEN verify overlap between Group 5 API average and Group 6 API average on the PIP is within 20 to 30%:

(100 - Group 5 API average) + (Group 6 API average) = overlap

(100 - _____) + (_____) = _____

_____
IV

Calculation Independent Verification completed by _____ Date _____

_____ • Document in the Unit Log that rod groups 5 and 6 are within the overlap limits specified in the COLR (SR 3.2.1.1).

_____ t. WHEN the count rate has stabilized,
THEN update the 1/M plot(s).

_____ u. The Reactor Engineer using the 1/M Plot data has predicted the reactor (circle the response)

IS LIKELY TO IS NOT LIKELY TO

go critical prior to completion of the next specified rod withdrawal to 150 Rod Index.

_____ v. Review Attachment 2, Rod Control and Sequence Operation Notes.

CAUTION 4.2.25.w

Criticality should be anticipated any time during rod withdrawal.

w. Simultaneously perform the following:

_____ • Withdraw the Regulating Rods to 150 Rod Index,

_____ • Limit the maximum Startup Rate to 0.5 dpm with no rod motion,

_____ • Limit the maximum Startup Rate to 1.0 dpm with rod motion,

_____ • Monitor for criticality.

_____ • IF criticality is achieved,
THEN GO TO Step 4.2.25.ww.

_____ x. WHEN the count rate has stabilized,
THEN update the 1/M plot(s).

_____ y. The Reactor Engineer using the 1/M Plot data has predicted the reactor (circle the response)

IS LIKELY TO IS NOT LIKELY TO

go critical prior to completion of the next specified rod withdrawal to 175 Rod Index.

_____ z. Review Attachment 2, Rod Control and Sequence Operation Notes.

CAUTION 4.2.25.aa

Criticality should be anticipated any time during rod withdrawal.

aa. Simultaneously perform the following:

_____ • Withdraw the Regulating Rods to 175 Rod Index,

_____ • Limit the maximum Startup Rate to 0.5 dpm with no rod motion,

_____ • Limit the maximum Startup Rate to 1.0 dpm with rod motion,

_____ • Monitor for criticality.

_____ • IF criticality is achieved,
THEN GO TO Step 4.2.25.ww.

_____ bb. WHEN the count rate has stabilized,
THEN update the 1/M plot(s).

_____ cc. The Reactor Engineer using the 1/M Plot data has predicted the reactor (circle the response)

IS LIKELY TO IS NOT LIKELY TO

go critical prior to completion of the next specified rod withdrawal to 200 Rod Index.

_____ dd. Review Attachment 2, Rod Control and Sequence Operation Notes.

NOTE 4.2.25.ee

200 Rod Index is 87.5% on Group 6 and 12.5% on Group 7.

CAUTION 4.2.25.ee

Criticality should be anticipated any time during rod withdrawal.

ee. Simultaneously perform the following:

_____ • Withdraw the Regulating Rods to 200 Rod Index,

_____ • Limit the maximum Startup Rate to 0.5 dpm with no rod motion,

_____ • Limit the maximum Startup Rate to 1.0 dpm with rod motion,

_____ • Monitor for criticality.

_____ • IF criticality is achieved,
THEN GO TO Step 4.2.25.ww.

_____ ff. WHEN the count rate has stabilized,
THEN update the 1/M plot(s).

_____ gg. The Reactor Engineer using the 1/M Plot data has predicted the reactor (circle the response)

IS LIKELY TO IS NOT LIKELY TO

go critical prior to completion of the next specified rod withdrawal to 225-227 Rod Index.

_____ hh. Review Attachment 2, Rod Control and Sequence Operation Notes.

CAUTION 4.2.25.ii

Criticality should be anticipated any time during rod withdrawal.

ii. Simultaneously perform the following:

_____ • Without exceeding 227 Rod Index (Group 7 27% WD), Withdraw the Regulating Rods until Group 6 CONTROL ON lights go OFF,

_____ • Limit the maximum Startup Rate to 0.5 dpm with no rod motion,

_____ • Limit the maximum Startup Rate to 1.0 dpm with rod motion,

_____ • Monitor for criticality.

_____ • IF criticality is achieved,
THEN GO TO Step 4.2.25.ww.

_____ • IF Group 6 CONTROL ON lights go OFF prior to the Rod Control Panel Group 6 OUT LIMIT being reached,
THEN REFER TO DB-OP-06402, CRD Operating Procedure, to obtain 100 PERCENT and OUT LIMIT lights for all rods in a group.

_____ • WHEN Group 6 Rod Control Panel CONTROL ON light is OFF,
AND Group 6 Rod Control Panel OUT LIMIT light is ON,
THEN verify overlap between Group 6 API average and Group 7 API average on the PIP is within 20 to 30%:

(100 - Group 6 API average) + (Group 7 API average) = overlap

(100 - _____) + (_____) = _____

_____
IV

Calculation Independent Verification completed by _____ Date _____

_____ • Document in the Unit Log that rod groups 6 and 7 are within the overlap limits specified in the COLR (SR 3.2.1.1).

_____ jj. WHEN the count rate has stabilized,
THEN update the 1/M plot(s).

_____ kk. The Reactor Engineer using the 1/M Plot data has predicted the reactor (circle the response)

IS LIKELY TO IS NOT LIKELY TO

go critical prior to completion of the next specified rod withdrawal to 250 Rod Index.

_____ ll. Review Attachment 2, Rod Control and Sequence Operation Notes.

> CAUTION 4.2.25.mm
>
> Criticality should be anticipated any time during rod withdrawal.

mm. Simultaneously perform the following:

_____ • Withdraw the Regulating Rods to 250 Rod Index,

_____ • Limit the maximum Startup Rate to 0.5 dpm with no rod motion,

_____ • Limit the maximum Startup Rate to 1.0 dpm with rod motion,

_____ • Monitor for criticality.

_____ • IF criticality is achieved,
THEN GO TO Step 4.2.25.ww.

_____ nn. WHEN the count rate has stabilized,
THEN update the 1/M plot(s).

_____ oo. The Reactor Engineer using the 1/M Plot data has predicted the reactor (circle the response)

IS LIKELY TO IS NOT LIKELY TO

go critical prior to completion of the next specified rod withdrawal to 275 Rod Index.

_____ pp. Review Attachment 2, Rod Control and Sequence Operation Notes.

> CAUTION 4.2.25.qq
>
> Criticality should be anticipated any time during rod withdrawal.

qq. Simultaneously perform the following:

_____ • Withdraw the Regulating Rods to 275 Rod Index,

_____ • Limit the maximum Startup Rate to 0.5 dpm with no rod motion,

_____ • Limit the maximum Startup Rate to 1.0 dpm with rod motion,

_____ • Monitor for criticality.

_____ • IF criticality is achieved,
THEN GO TO Step 4.2.25.ww.

_____ rr. WHEN the count rate has stabilized,
THEN update the 1/M plot(s).

_____ ss. The Reactor Engineer using the 1/M Plot data has predicted the reactor (circle the response)

IS LIKELY TO IS NOT LIKELY TO

go critical prior to completion of the next specified rod withdrawal to 300 Rod Index.

_____ tt. Review Attachment 2, Rod Control and Sequence Operation Notes.

CAUTION 4.2.25.uu

Criticality should be anticipated any time during rod withdrawal.

uu. Simultaneously perform the following:

_____ • Withdraw the Regulating Rods to 300 Rod Index,

_____ • Limit the maximum Startup Rate to 0.5 dpm with no rod motion,

_____ • Limit the maximum Startup Rate to 1.0 dpm with rod motion,

_____ • Monitor for criticality.

_____ • IF criticality is achieved,
THEN GO TO Step 4.2.25.ww.

vv. IF criticality was NOT achieved,
THEN perform the following:

_____ a. WHEN the count rate has stabilized,
THEN update the 1/M plot(s).

_____ b. Insert the Regulating Rods to 150 Rod Index.
REFER TO step 2.1.15.

ww. Record the following here
AND in the Unit Log:

_____ • Date criticality was achieved _____

_____ • Time criticality was achieved _____

_____ • Rod Index criticality was achieved _____

CAUTION 4.2.26.

- The maximum startup rate with no rod motion is 0.5 DPM, the maximum startup rate during Control Rod withdrawal is 1.0 DPM.
- Read Steps 4.2.26 through 4.2.27 before proceeding.

_____ 4.2.26 WHEN criticality has been established,
THEN withdraw the Regulating Rods
OR dilute the RCS, if all control rods are withdrawn, to obtain a positive Startup Rate.

4.2.27 As power is being raised perform the following:

_____ a. Observe the Source Range and Intermediate Range Instruments for the required overlap
AND record the successful completion of instrument overlap in the Unit Log. Refer to Technical Requirements Manual TVR 8.3.10.1.

_____ b. IF instrument overlap starts prior to $1x10^3$ CPS,
THEN stop the power increase
AND notify the Shift Manager.

NOTE 4.2.27.c

Overlap must start by $1x10^5$ CPS, otherwise 1 decade of overlap will not be available as required by TVR 8.3.10.1.

_____ c. IF instrument overlap has NOT started by $1x10^5$ CPS,
THEN stop the power increase
AND notify the Shift Manager.

_____ 4.2.28 Insert the Regulating Rods as necessary to stabilize power between $8x10^{-9}$ and $1.2x10^{-8}$ AMPS on the Intermediate Range Nuclear Instruments.

NOTE 4.2.29

Source Range Nuclear Instruments should deenergize when either:

- Both IRs >$1x10^{-9}$ amps, or
- [NI5 or 6] and [NI7 or 8] >10%FP

_____ 4.2.29 Verify Source Range Nuclear Instruments are deenergized.

NOTE 4.2.30

Until the RCS sample is obtained, Boron concentration must be held constant. It is not necessary to wait for the results of the Boron sample prior to raising Reactor power.

4.2.30 IF Reactor Engineering requests to evaluate expected versus actual critical rod position, THEN request Chemistry to perform the following:

NOTE 4.2.30.a

Each RCS sample must contain a sufficient volume to allow for three separate analyses.

_____ a. Have Chemistry obtain two RCS samples for analyzing boron concentration from the purification demineralizer inlet.

_____ b. Notify the Control Room when the samples are obtained.

_____ c. Run 3 separate analysis for Boron concentration on a sample.

_____ d. Average the results of the 3 separate analysis.

_____ e. Report the averaged Boron concentrations to the Control Room.

_____ f. Hold the other RCS sample for a backup until the Control Room informs Chemistry that the second sample is no longer required.

4.2.31 Record the following information here, AND in the Unit Log:

_____ • Date _____

_____ • Time _____

_____ • Tave _____ °F

_____ • Rod Index _____ RI

_____ • APSR % withdrawn _____ %

_____ • NI 3 _____ amps

_____ • NI 4 _____ amps

_____ • Effective Full Power Days _____ (EFPD)

_____ • RCS Boron concentration provided by Chemistry _____ ppmb.

_____ 4.2.32 Verify with the Reactor Engineer that criticality was achieved within ±0.5%Δk/k of predicted.

_____ 4.2.33 IF the Reactor Engineer requested an RCS Boron sample and analysis, AND determines the Boron sample reported by Chemistry is NOT reasonable, THEN inform Chemistry to perform Steps 4.2.30.c through 4.2.30.e on the second RCS sample taken.

_____ 4.2.34 IF the Reactor Engineer requested an RCS Boron sample and analysis, AND determines the Boron sample is reasonable, THEN consult with the Reactor Engineer to determine if the second sample should be retained.

NOTE 4.2.35

This step may have to be held open until completed in DB-OP-06901, Plant Startup, at a later time in order to satisfy Technical Specification requirements.

4.2.35 IF criticality was achieved prior to 125 Rod Index, THEN perform the following:

_____ a. Review Attachment 2, Rod Control and Sequence Operation Notes.

_____ b. IF Group 5 CONTROL ON lights go OFF prior to the Rod Control Panel Group 5 OUT LIMIT being reached, THEN REFER TO DB-OP-06402, CRD Operating Procedure, to obtain 100 PERCENT and OUT LIMIT lights for all rods in a group.

_____ c. WHEN Group 5 Rod Control Panel CONTROL ON light is OFF,
AND Group 5 Rod Control Panel OUT LIMIT light is ON,
THEN verify overlap between Group 5 API average and Group 6 API average on the PIP is within 20 to 30%:

(100 - Group 5 API average) + (Group 6 API average) = overlap

(100 - _____) + (_____) = _____

_____
IV

Calculation Independent Verification completed by _____ Date _____

_____ d. Document in the Unit Log that rod groups 5 and 6 are within the overlap limits specified in the COLR (SR 3.2.1.1).

> NOTE 4.2.36
>
> This step may have to be held open until completed in DB-OP-06901, Plant Startup, at a later time in order to satisfy Technical Specification requirements.

4.2.36 IF criticality was achieved prior to 225 Rod Index,
THEN perform the following:

_____ a. Review Attachment 2, Rod Control and Sequence Operation Notes.

_____ b. IF Group 6 CONTROL ON lights go OFF prior to the Rod Control Panel Group 6 OUT LIMIT being reached,
THEN REFER TO DB-OP-06402, CRD Operating Procedure, to obtain 100 PERCENT and OUT LIMIT lights for all rods in a group.

_____ c. WHEN Group 6 Rod Control Panel CONTROL ON light is OFF,
AND Group 6 Rod Control Panel OUT LIMIT light is ON,
THEN verify overlap between Group 6 API average and Group 7 API average on the PIP is within 20 to 30%:

(100 - Group 6 API average) + (Group 7 API average) = overlap

(100 - _____) + (_____) = _____

_____
IV

Calculation Independent Verification completed by _____ Date _____

_____ d. Document in the Unit Log that rod groups 6 and 7 are within the overlap limits specified in the COLR (SR 3.2.1.1).

_____ 4.2.37 GO TO DB-OP-06901, Plant Startup.

Section 4.2 completed by _____ Date _____

5.0 REFERENCES

5.1 Developmental

5.1.1 USAR, Sections 4.3.5, 5.3.7, 7.4.1, 14.1.7.3, and 15.2.1

5.1.2 ECP 16-0507, Abandonment of the Boronometer and Associated Components

5.2 Implementing

5.2.1 TS 3.1.1, 3.4.2, 3.1.4, 3.1.5, 3.2.1, 3.2.2, TRM 8.3.10

5.2.2 SR 3.1.5.1, 3.2.1.1, 3.2.1.3 and TVR 8.3.10.1

5.2.3 DB-NE-03212, Zero Power Physics Testing

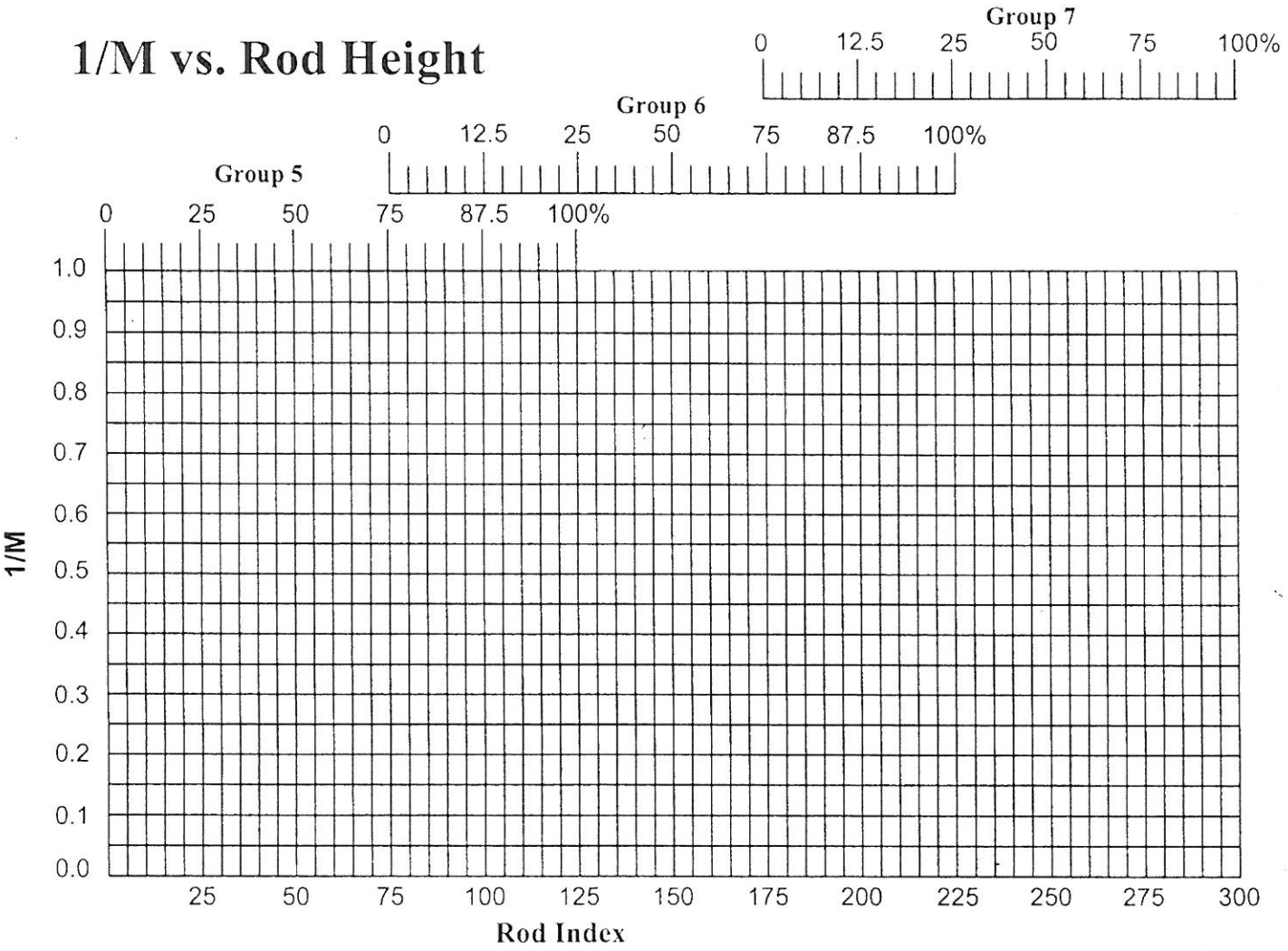
5.2.4 DB-NE-06202, Reactivity Balance Calculations

5.2.5 DB-OP-06402, CRD Operating Procedure

5.2.6 DB-OP-06901, Plant Startup

ATTACHMENT 1: 1/M PLOT
Page 1 of 4

1/M vs. Rod Height



Lower Limit 121.7 ECP 165.3 Upper Limit 237.9

Date: Today

Time: Now

Performed By: _____

RCS Boron Concentration: 1719 ppmB

PZR Boron Concentration: 1710 ppmB

MUT Boron Concentration: 1710 ppmB

ATTACHMENT 1: 1/M PLOT
Page 2 of 4

Count Rate Source NI1 (NI2) Computer Point R796 R805
(Circle Source Used)

Base Count Rate 266 cps

1/M = (Base Count Rate)/(Present Count Rate)

Rod Index	Count Rate	1/M	Pred Critical Pos.
25	289		
50	350		
75	512		
100	1662		
125-127 (_____) Record actual R.I.			
150			
175			
200			
225-227(_____) Record actual R.I.			
250			
275			

ATTACHMENT 1: 1/M PLOT
Page 3 of 4

NOTE 1

The 1/M Plot is used to help predict the approach to critical conditions. An approach to critical conditions is indicated by the 1/M value approaching zero. A 1/M plot can be extrapolated in order to predict the point at which criticality may be achieved.

CAUTION 1

The 1/M plot is only a tool to be used as an aid in predicting criticality. As always CRITICALITY SHALL BE EXPECTED AT ANY TIME.

INSTRUCTIONS

Record the following on pages 1 and 2 of Attachment 1, 1/M Plot:

1. Name, date and time.
2. RCS Boron Concentration
3. PZR Boron Concentration
4. MUT Boron Concentration
5. Circle the Count Rate Source to be used.
6. Record the base count rate - this is the count rate with groups 1-4 withdrawn and prior to withdrawing group 5.
7. Record the Predicted point of Criticality (ECP), Upper Limit and Lower Limit.
8. IF the count rates are taken from the computer point,
   THEN convert from Log count rate to counts per second as necessary.

ATTACHMENT 1: 1/M PLOT
Page 4 of 4

NOTE 9

As criticality is approached 1/M values can be plotted more often than every 25 Rod Index to obtain a more accurate prediction of criticality.

9. Calculate and record the Count Rate and rod index at the rod index intervals used then calculate and record the 1/M value using the formula below:

$$1/M = CR_0/CR_1$$

where CR_0 = the base count rate recorded in Step 6.

CR_1 = the count rate recorded at the current rod index i.e. 25, 50, etc.

10. Plot the value calculated in Step 9 on the vertical (1/M) axis for the given rod index.

11. Plot the 1/M by connecting the last two data points on the graph and extending the line down to meet the horizontal (Rod index) axis is the expected index of criticality and record for the present Rod Index.

12. Record the predicted Critical Position calculated.

ATTACHMENT 2: ROD CONTROL AND SEQUENCE OPERATION NOTES
Page 1 of 2

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ATTACHMENT 2: ROD CONTROL AND SEQUENCE OPERATION NOTES
Page 2 of 2

- When a Regulating Rod group is enabled by the DCRDCS TMR Controller, the associated group CONTROL ON light on the Rod Control Panel will be ON and the individual rod CONTROL ON indicators for that group on the Rod PIP will be Blue.

- Individual control rods may be enabled for movement when the Rod Control Panel is in both MANUAL and SEQ BYPASS by selecting the desired group and rod, observing the GROUP and individual CONTROL ON indicators are ON.

- Each control rod can be individually withdrawn or inserted to the Out or In Limit regardless of Group Limit status.

- When an individual rod is withdrawn to 100 percent, the Rod PIP bar graph for that rod is completely Gray and 100% is indicated in the digital API display above the bar graph.

- Individual control rods withdrawn to the Out Limit are indicated by a red rectangle at the top of a completely Gray bar graph on the Rod PIP.

- When the first Control Rod in a Group reaches its out limit, the Rod Control Panel Group OUT LIMIT lamp comes ON and out motion on that rod stops. Continuous Group Out motion command can continue for the remaining rods which have not reached their Out Limit, for up to 12 seconds (as indicated by the CRD TRAVEL OUT lamp), to ensure each Rod in the Group is fully withdrawn and reaches it's Out Limit.

- A second Operator should monitor Group 5 and 6 CONTROL ON status as they approach Out Limits to communicate status to the ATC Operator.

- Regulating rod group sequence operation is enabled by the DCRDCS TMR Controller to maintain 25% overlap between adjacent Regulating Rod Groups.

- During Regulating Rod withdrawal in SEQ, Group 6 will be enabled by the TMR Controller when Group 5 reaches 75% withdrawn based on API Group Average.

- During Regulating Rod withdrawal in SEQ, Group 7 will be enabled by the TMR Controller when Group 6 reaches 75% withdrawn based on API Group Average.

- During Regulating Rod insertion in SEQ, Group 6 will be enabled by the TMR Controller when Group 7 reaches 25% withdrawn based on API Group Average.

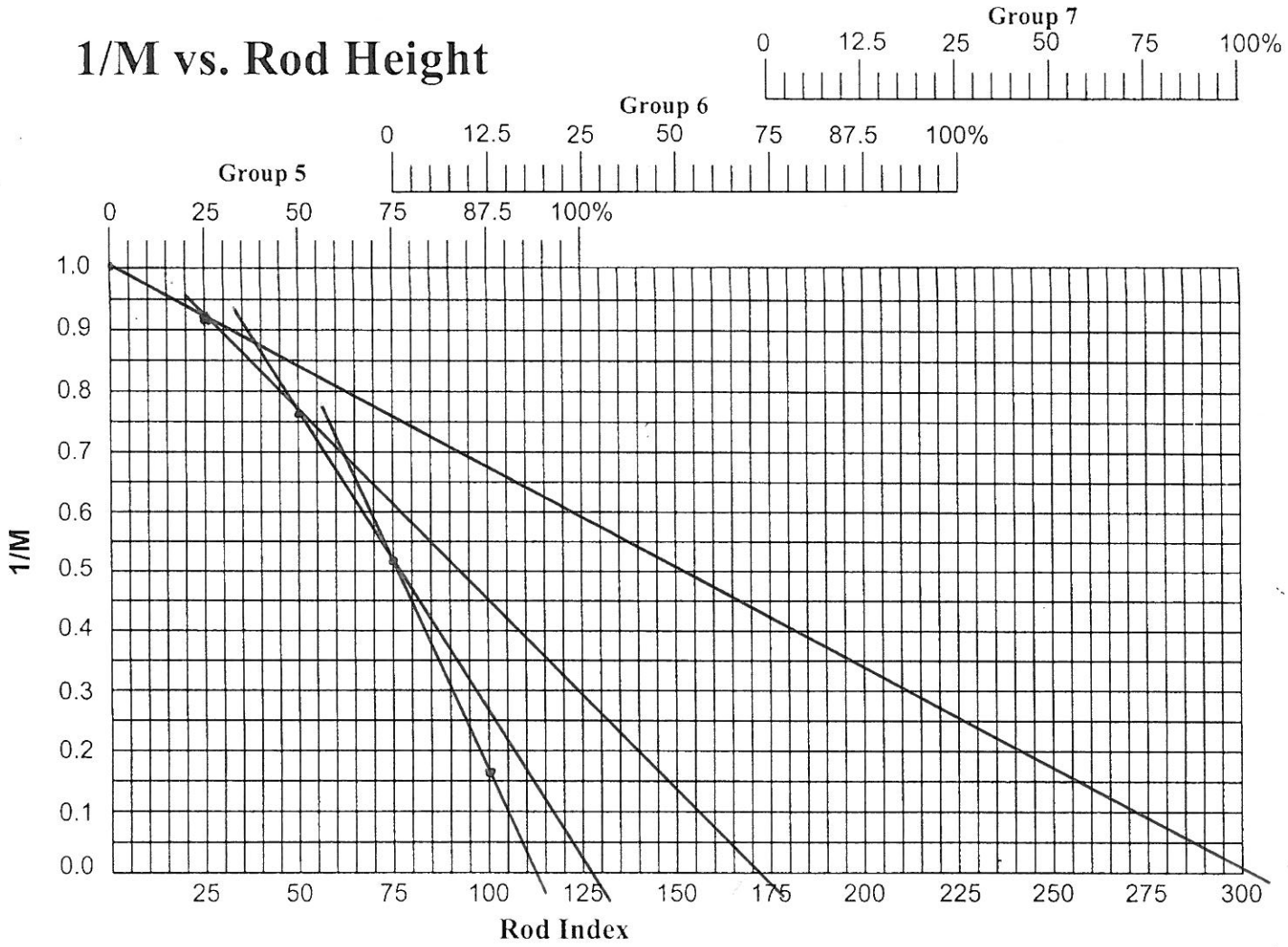
- During Regulating Rod insertion in SEQ, Group 5 will be enabled by the TMR Controller when Group 6 reaches 25% withdrawn based on API Group Average.

- Adjacent Regulating Rod Group operation in the overlap region is permitted as long as the overlap is within 22 to 28% (RPI Sequence Monitoring).

- During Regulating Rod withdrawal, manipulation to get individual rod Out Limits is not required during approach to criticality provided the Rod Control Panel Group OUT LIMIT is ON and the rod is visually aligned with the Group. The Shift Manager will determine when this manipulation should be performed.

ATTACHMENT 1: 1/M PLOT
Page 1 of 4

1/M vs. Rod Height



Lower Limit 121.7 ECP 165.3 Upper Limit 237.9

Date: Today

Time: Now

Performed By: Applicant

RCS Boron Concentration: 1720 ppmB

PZR Boron Concentration: 1710 ppmB

MUT Boron Concentration: 1710 ppmB

ATTACHMENT 1: 1/M PLOT
Page 2 of 4

Count Rate Source NI1 (NI2) Computer Point R796 R805
(Circle Source Used)

Base Count Rate 266 cps

1/M = (Base Count Rate)/(Present Count Rate)

Rod Index	Count Rate	1/M	Pred Critical Pos.
25	289	.92	>300
50	350	.76	160-180
75	512	.52	117-137
100	1662	.16	102-122
125-127 (_____) Record actual R.I.			
150			
175			
200			
225-227(_____) Record actual R.I.			
250			
275			

Not Critical

Admin JPM
RO-A2

Examinee: _____ **Date:** _____

Examiner: _____

Facility: Davis-Besse **JPM No**: OPS-JPM-NEW (335)

Task Title: Perform a Leak Isolation

Task No: 119-035-0100 **System:** 008 Component Cooling Water System

K/A Reference: G2.2.15 (3.9) R3 **Safety Function**: _____

Time Critical Task: No **Alternate Path:** No

Validation Time: 25 minutes

Method of testing / Location:

Simulated Performance ___ Actual Performance _X_

Classroom _X_ Simulator ___ Plant ___

Task Standard:
Identify valves / pumps to isolate a CCW break using mechanical prints

Required Materials:
OS21 Sheet 1 – Operational Schematic Component Cooling Water System (Rev. 39)
OS21 Sheet 3 - Operational Schematic Component Cooling Water System (Rev. 12)

General References:
OS Drawings Book
Magnifying Glass

Notes:
This Admin JPM is a 2-part JPM and will require two classrooms to facilitate it.

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

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

.

EXAMINER COPY

INITIAL CONDITIONS:

All plant systems are in a normal alignment.

Component Cooling Water (CCW) Pump 1 is in STBY.

Component Cooling Water (CCW) Pump 2 is running.

CCW Pump 3 is lined-up Spare as Pump 2

INITIATING CUES:

The Control Room receives a call reporting a leak from the Component Cooling Water system coming from the inlet weld to the Component Cooling Heat Exchanger 1-1.

The crew has opened DW2643, CCW Surge Tank Demin Water Makeup Valve to maintain normal CCW Surge Tank level.

The Unit Supervisor directs you to identify the valves needed to isolate the leak.

(Provide examinee with a set of Operational Schematics or access to filenet)

CANDIDATE COPY

INITIAL CONDITIONS:

All plant systems are in a normal alignment.

Component Cooling Water (CCW) Pump 1 is in STBY.

Component Cooling Water (CCW) Pump 2 is running.

CCW Pump 3 is lined-up Spare as Pump 2

INITIATING CUES:

The Control Room receives a call reporting a leak from the Component Cooling Water system coming from the inlet weld to the Component Cooling Heat Exchanger 1-1.

The crew has opened DW2643, CCW Surge Tank Demin Water Makeup Valve to maintain normal CCW Surge Tank level.

The Unit Supervisor directs you to identify the valves needed to isolate the leak and list affected components.

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: _____

1. PERFORMANCE STEP: Identify prints needed.
.....C.....

STANDARD: Identifies correct print for where the CCW System leak is located: OS-021 SH 1.

CUE: **Once candidate identifies print(s), provide a copy of Component Cooling Water System Schematics (OS-021 SH 1-3)**

SAT UNSAT

2. PERFORMANCE STEP: Identify components to isolate CCW leak
.....C.....

STANDARD: Uses identified prints to isolate CCW leak.

- CC32, CCW Heat Exchanger 1 Outlet Butterfly CLOSED
- CC1, CCW Pump 1 Suction Butterfly Valve CLOSED
- P43-1, CCW Pump 1 OOS. (Place CCW Pump 3 as 1 in STBY, is also acceptable)

NOTE: Other components may be identified for equipment protection such as HPI and LPI Pumps, or EDG 1, these are to be treated as NON-CRITICAL.

CUE: **Once the candidate identifies the equipment that must be manipulated, role play as the Unit Supervisor as required.**

- **IF the isolation plan includes CC1,**
"The operator in the field is unable to close CC1 and the CCW leak continues. Identify additional components which MUST be manipulated to isolate the CCW leak."

- **IF the candidate has already expanded the isolation points, evaluate the boundary to ensure the leak has been isolated (JPM Step 3), and mark this JPM Step N/A.**

SAT UNSAT

3. PERFORMANCE STEP: Identify valves to isolate CCW leak
.....C.....

STANDARD: Uses identified prints to isolate CCW leak.

Normally CLOSED valves are NOT listed.

CCW Pump 3 as 1 is also not listed since it was initially lined up as spare.

The following identify the MINIMUM valves to be closed to isolate the leak based on **CC1** failing to close.

- CC123, CCW Surge Tank Isolation (from Sheet 3)
- CC172, CCW From Decay Heat Cooler 1 Outlet Iso
- CC661, CCW From HPI & DH Pump 1 Normal Source Outlet
- CC162, CCW From EDG 1 Outlet Iso
- CC243, CTMT Gas Analyzer 1 Normal Source Outlet

The following identify the MINIMUM valves to be closed to isolate the leak if **CC32** was NOT used as an isolation.

- CC653, CCW to HPI & DH Pump 1 Normal Source
- CC165, CCW to EDG 1 Inlet Iso
- CC156, CCW to Decay Heat Cooler 1 Inlet Iso
- CC239, Containment Gas Analyzer 1 Normal Source Inlet

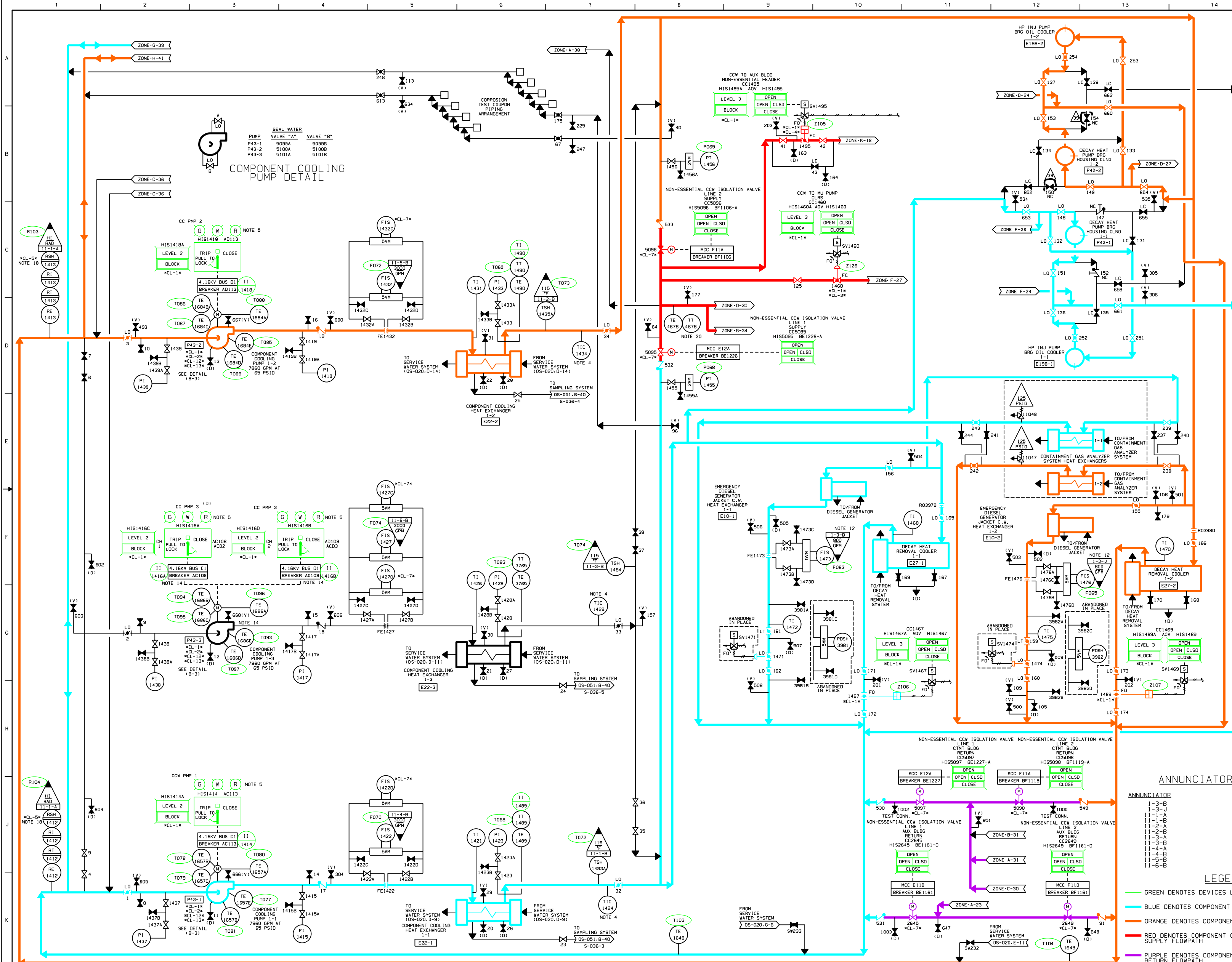
NOTE: Other components may be identified, if that is the case, these are to be treated as NON-CRITICAL portions of this step.

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 ITT
- 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	ENGR	ENGR SUPV	SYS ENGR	OPS ENGR	DES MGR
39	4/4/16	INC. DUN 15-0040-001 -005 & 15-0041-001-005 BOTH REV.0	SBW	SAP	—	BTR	—	—	—
38	6/1/15	INC. DUN 15-0293-001 -002 REV.00	SBW	SAP	—	CDA	—	—	—
37	3/20/14	INC. DUN 11-0614-001 -005 REV.00	SBW	SAC	—	SSK	—	—	—
0	11/4/88	INFORMATION ONLY	HB	EWT	HRB	CML	JLL	MP	JAN VMW

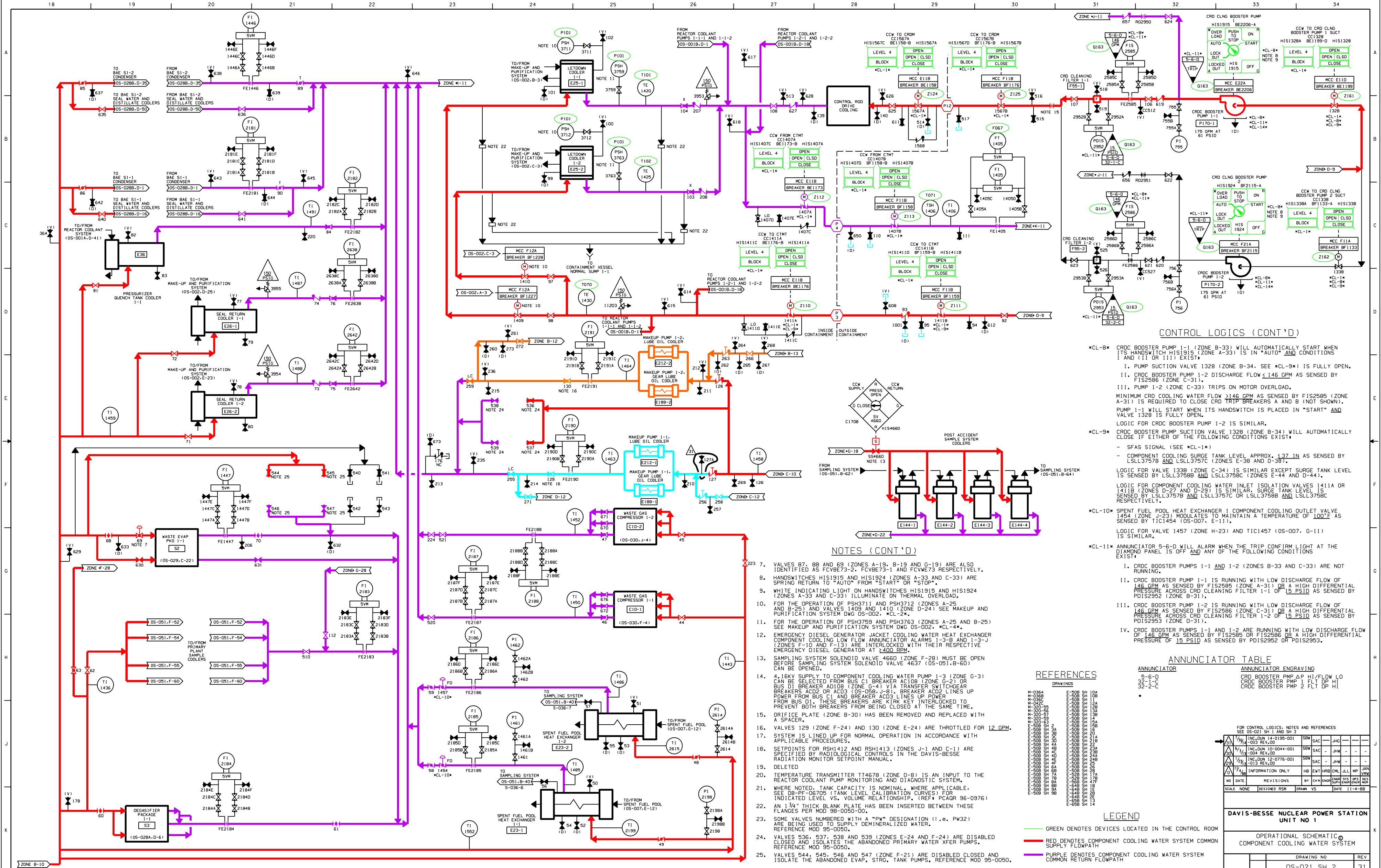
SCALE NONE | DESIGNED RSM | DRAWN ATR | DATE 11-4-88

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.

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
M-036B
M-036C
M-042C
M-320-55
M-320-56
M-320-57
M-320-59
M-320-63
E-50B SH 2
E-50B SH 3A
E-50B SH 3B
E-50B SH 3C
E-50B SH 3D
E-50B SH 4A
E-50B SH 4B
E-50B SH 4C
E-50B SH 4D
E-50B SH 4E
E-50B SH 4F
E-50B SH 6A
E-50B SH 6B
E-50B SH 7A
E-50B SH 7B
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E-50B SH 9A
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E-50B SH 11
E-50B SH 12A
E-50B SH 12B
E-50B SH 13A
E-50B SH 13B
E-50B SH 14
E-50B SH 15A
E-50B SH 15B
E-50B SH 16
E-50B SH 20
E-50B SH 21A
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E-50B SH 22
E-50B SH 23A
E-50B SH 23B
E-50B SH 24A
E-50B SH 24B
E-50B SH 25
E-50B SH 26
E-50B SH 28
E-52B SH 17A
E-52B SH 17B
E-56B SH 47F
E-64B SH 1B
E-64B SH 1E
E-64B SH 2B
E-64B SH 2E
E-65B SH 13
E-65B SH 14

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

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'K	ENGR	ENGR SUPV	SYS ENGR	OPS ENGR	DES MGR
31	7/30/14	INC.DUN 14-0195-001 -003 REV.00	SBW	SAC	—	JHG	—	—	—
30	6/3/13	INC.DUN 10-0044-001 -004 REV.00	SBW	SAC	-	JHW	-	-	-
29	1/23/13	INC.DUN 12-0776-001 -013 REV.00	SBW	SAC	-	JHW	-	-	-
0	11/4/88	INFORMATION ONLY	HB	EWT	HRB	CML	JLL	MP	JAN VMW

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
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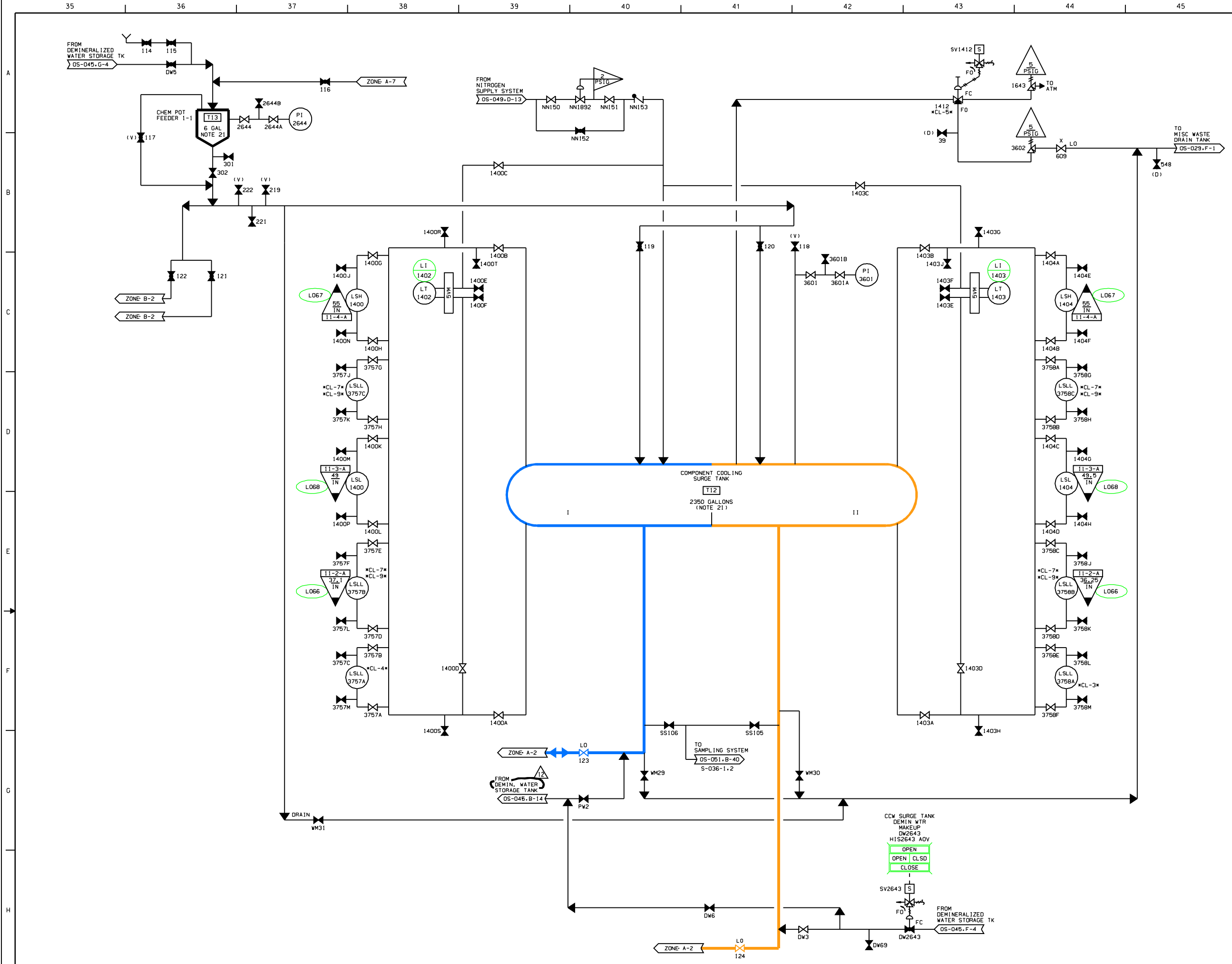

CONTROL LOGICS (CONT'D)

CL-12 THE STANDBY COMPONENT COOLING WATER PUMP WILL START WHEN LOW FLOW (<1000 GPM) IS SENSED BY THE LOW FLOW SWITCH ACCORDING TO THE FOLLOWING TABLE:

RUNNING COMPONENT COOLING WATER PUMP	STANDBY COMPONENT COOLING WATER PUMP	LOW FLOW SWITCH <1000 GPM
1-1 (ZONE K-3)	1-2 (ZONE D-3)	FIS1422D (ZONE J-5)
1-1 (ZONE K-3)	1-3 (ZONE G-3)	FIS1422D (ZONE J-5)
1-2 (ZONE D-3)	1-1 (ZONE K-3)	FIS1432C (ZONE C-5)
1-2 (ZONE D-3)	1-3 (ZONE G-3)	FIS1432C (ZONE C-5)
1-3 (ZONE G-3)	1-1 (ZONE K-3)	FIS1427C (ZONE F-5)
1-3 (ZONE G-3)	1-2 (ZONE D-3)	FIS1427D (ZONE G-5)

CL-13 SFAS ONLY:

IF COMPONENT COOLING WATER (CCW) PUMP 1-1 (ZONE K-3) IS RUNNING IT WILL STAY RUNNING UPON SFAS. IF CCW 1-1 IS THE STAND BY PUMP IT WILL START UPON RECEIVING A SFAS SIGNAL.

IF COMPONENT COOLING WATER (CCW) PUMP 1-3 (ZONE G-3) IS RUNNING AS CCW PUMP 1-1, IT WILL STAY RUNNING IF CCW 1-3 IS IN STANDBY FOR CCW PUMPS 1-1 IT WILL START UPON RECEIVING A SFAS SIGNAL.

LOOP ONLY:

IF COMPONENT COOLING WATER (CCW) PUMP 1-1 IS RUNNING IT WILL RESTART WHEN EDG 1-1 STARTS AND ITS OUTPUT BREAKER CLOSES. IF CCW 1-1 IS THE STANDBY PUMP IT WILL START 10 SECONDS AFTER EDG 1-1 OUTPUT BREAKER CLOSES.

IF COMPONENT COOLING WATER (CCW) PUMP 1-3 IS RUNNING AS CCW PUMP 1-1, IT WILL RESTART UPON ITS ASSOCIATED EDG START AND BREAKER CLOSURE. IF CCW 1-3 IS IN STANDBY FOR CCW PUMPS 1-1 IT WILL START 10 SECONDS AFTER ITS ASSOCIATED EDG OUTPUT BREAKER CLOSES.

SFAS WITH LOOP:

IF COMPONENT COOLING WATER (CCW) PUMP 1-1 IS RUNNING IT WILL RESTART WHEN EDG 1-1 STARTS AND ITS OUTPUT BREAKER CLOSES. IF CCW 1-1 IS THE STANDBY PUMP IT WILL START WHEN EDG 1-1 OUTPUT BREAKER CLOSES.

IF COMPONENT COOLING WATER (CCW) PUMP 1-3 IS RUNNING AS CCW PUMP 1-1, IT WILL RESTART UPON ITS ASSOCIATED EDG START AND BREAKER CLOSURE. IF CCW 1-3 IS IN STANDBY FOR CCW PUMPS 1-1 IT WILL START WHEN ITS ASSOCIATED EDG OUTPUT BREAKER CLOSES.

LOGIC FOR COMPONENT COOLING WATER PUMP 1-2, P43-2 (ZONE D-3) IS SIMILAR

CL-14 CRDC BOOSTER PUMP 1-1 WILL AUTOMATICALLY TRIP IF ANY OF THE FOLLOWING CONDITIONS EXIST:

- PUMP SUCTION VALVE 1328 (ZONE B-34) IS NOT FULLY OPEN
- MOTOR OVERLOAD CONDITION EXISTS

LOGIC FOR CRDC BOOSTER PUMP 1-2 (ZONE C-33) IS SIMILAR EXCEPT PUMP SUCTION VALVE IS 1338 (ZONE C-34)

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

FOR CONTROL LOGICS, NOTES AND REFERENCES SEE OS-021 SH 1 AND SH 2

NO	DATE	REVISIONS	BY	CH'K	ENGR	ENGR SUPV	SYS ENGR	OPS ENGR	DES MGR
12	7/13/07	INC. DCN OS-21-81 PER MOD 95-0050-00	SBW	SAS	—	SJO	—	—	—
11	3/30/06	INC. DCN OS-21-124 PER ECR 05-0095-00 (CR 03-00949, CA 08) & GEN. UPDATE CORRECT SPELLING IN *CL-14* .LOGIC AND SIMILAR	SBW	MJM	—	JDK	—	—	—
10	3/17/06	INC. DCN OS-21-123 PER ECR 05-0095-00 (CR 03-00949, CA 08)	SBW	JDK	—	PWJ	—	—	—
9	9/11/00	INC. DCN OS-21-108 PER DDR 00-2062	SBW	JOR	—	GLB	—	—	—
0	7/29/91	ISSUED FOR DCR 91-0030	JOR	JAD JBG	JET	PKG	—	—	JPH

SCALE NONE | DESIGNED JP | DRAWN JOR | DATE 03-20-91

DAVIS-BESSE NUCLEAR POWER STATION UNIT NO 1

OPERATIONAL SCHEMATIC ©
COMPONENT COOLING WATER SYSTEM

DRAWING NO: OS-021 SH.3 | REV: 12

DB 07-02-07
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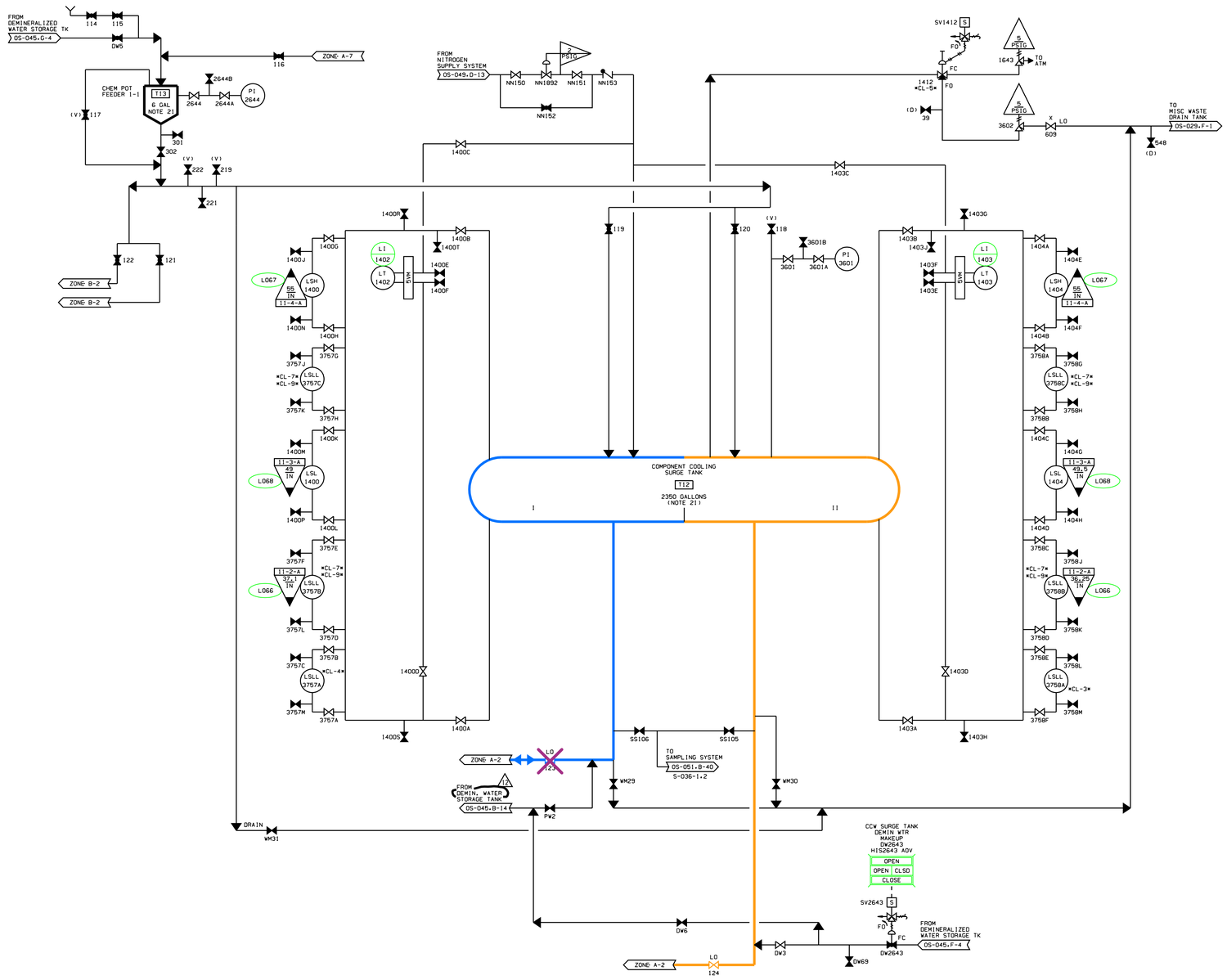

CONTROL LOGICS (CONT'D)

CL-12 THE STANDBY COMPONENT COOLING WATER PUMP WILL START WHEN LOW FLOW (<1000 GPM) IS SENSED BY THE LOW FLOW SWITCH ACCORDING TO THE FOLLOWING TABLE:

RUNNING COMPONENT COOLING WATER PUMP	STANDBY COMPONENT COOLING WATER PUMP	LOW FLOW SWITCH <1000 GPM
1-1 (ZONE K-3)	1-2 (ZONE D-3)	FIS1422D (ZONE J-5)
1-1 (ZONE K-3)	1-3 (ZONE G-3)	FIS1422D (ZONE J-5)
1-2 (ZONE D-3)	1-1 (ZONE K-3)	FIS1432C (ZONE C-5)
1-2 (ZONE D-3)	1-3 (ZONE G-3)	FIS1432C (ZONE C-5)
1-3 (ZONE G-3)	1-1 (ZONE K-3)	FIS1427C (ZONE F-5)
1-3 (ZONE G-3)	1-2 (ZONE D-3)	FIS1427D (ZONE G-5)

CL-13 SFAS ONLY:

IF COMPONENT COOLING WATER (CCW) PUMP 1-1 (ZONE K-3) IS RUNNING IT WILL STAY RUNNING UPON SFAS. IF CCW 1-1 IS THE STAND BY PUMP IT WILL START UPON RECEIVING A SFAS SIGNAL.

IF COMPONENT COOLING WATER (CCW) PUMP 1-3 (ZONE G-3) IS RUNNING AS CCW PUMP 1-1, IT WILL STAY RUNNING IF CCW 1-3 IS IN STANDBY FOR CCW PUMPS 1-1 IT WILL START UPON RECEIVING A SFAS SIGNAL.

LOOP ONLY:

IF COMPONENT COOLING WATER (CCW) PUMP 1-1 IS RUNNING IT WILL RESTART WHEN EDG 1-1 STARTS AND ITS OUTPUT BREAKER CLOSES. IF CCW 1-1 IS THE STANDBY PUMP IT WILL START 10 SECONDS AFTER EDG 1-1 OUTPUT BREAKER CLOSES.

IF COMPONENT COOLING WATER (CCW) PUMP 1-3 IS RUNNING AS CCW PUMP 1-1, IT WILL RESTART UPON ITS ASSOCIATED EDG START AND BREAKER CLOSURE. IF CCW 1-3 IS IN STANDBY FOR CCW PUMPS 1-1 IT WILL START 10 SECONDS AFTER ITS ASSOCIATED EDG OUTPUT BREAKER CLOSES.

SFAS WITH LOOP:

IF COMPONENT COOLING WATER (CCW) PUMP 1-1 IS RUNNING IT WILL RESTART WHEN EDG 1-1 STARTS AND ITS OUTPUT BREAKER CLOSES. IF CCW 1-1 IS THE STANDBY PUMP IT WILL START WHEN EDG 1-1 OUTPUT BREAKER CLOSES.

IF COMPONENT COOLING WATER (CCW) PUMP 1-3 IS RUNNING AS CCW PUMP 1-1, IT WILL RESTART UPON ITS ASSOCIATED EDG START AND BREAKER CLOSURE. IF CCW 1-3 IS IN STANDBY FOR CCW PUMPS 1-1 IT WILL START WHEN ITS ASSOCIATED EDG OUTPUT BREAKER CLOSES.

LOGIC FOR COMPONENT COOLING WATER PUMP 1-2, P43-2 (ZONE D-3) IS SIMILAR

CL-14 CROC BOOSTER PUMP 1-1 WILL AUTOMATICALLY TRIP IF ANY OF THE FOLLOWING CONDITIONS EXIST:

- PUMP SUCTION VALVE 1328 (ZONE B-34) IS NOT FULLY OPEN
- MOTOR OVERLOAD CONDITION EXISTS

LOGIC FOR CROC BOOSTER PUMP 1-2 (ZONE C-33) IS SIMILAR EXCEPT PUMP SUCTION VALVE IS 1338 (ZONE C-34)

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

FOR CONTROL LOGICS, NOTES AND REFERENCES SEE OS-021 SH 1 AND SH 2

NO	DATE	REVISIONS	BY	CH'K	ENGR	ENGR SUPV	SYS ENGR	OPS ENGR	DES MGR
12	7/17/97	INC. DCN OS-21-81 PER MOD 95-0050-00	SBW	SAS	—	SJO	—	—	—
11	3/10/96	INC. DCN OS-21-124 PER ECR 05-0095-00 (CR 03-00949, CA 08) & GEN. UPDATE CORRECT SPELLING IN *CL-14* ,LOGIC AND SIMILAR	SBW	MJM	—	JDK	—	—	—
10	3/17/95	INC. DCN OS-21-123 PER ECR 05-0095-00 (CR 03-00949, CA 08)	SBW	JDK	—	PWJ	—	—	—
9	9/15/93	INC. DCN OS-21-108 PER DDR 00-2062	SBW	JOR	—	OLB	—	—	—
0	7/29/91	ISSUED FOR DCN 91-0030	JOR	JAD JBC	JET	PKG	—	—	JPH

SCALE NONE | DESIGNED JP | DRAWN JOR | DATE 03-20-91

DAVIS-BESSE NUCLEAR POWER STATION UNIT NO 1

OPERATIONAL SCHEMATIC
COMPONENT COOLING WATER SYSTEM

DRAWING NO	REV
OS-021 SH. 3	12

DB 07-02-07
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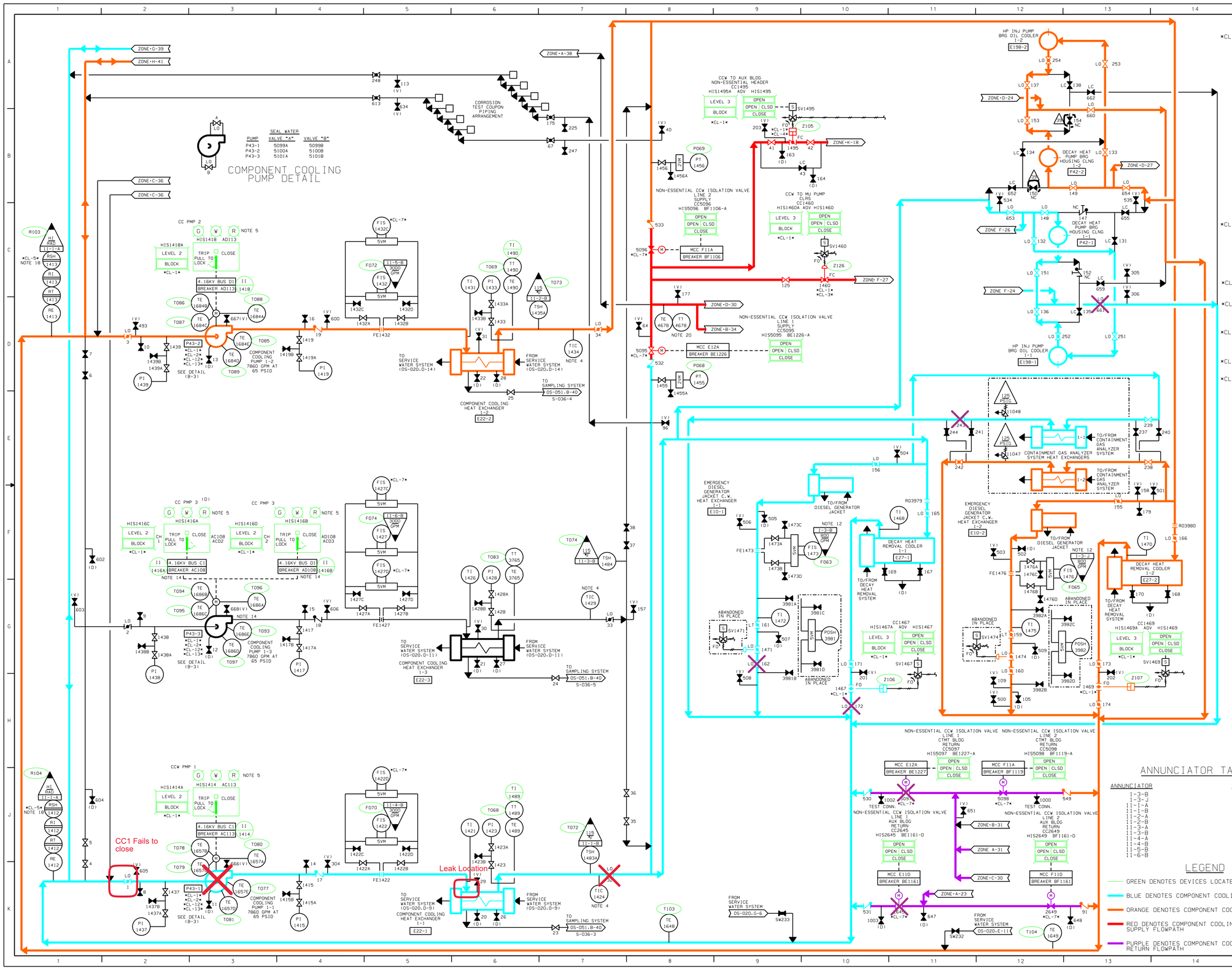

CONTROL LOGICS

×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 ITT
- 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	CHK	ENGR	ENGR SUPV	SYS ENGR	DES MGR
39	4/4/16	INC. DUN 15-0040-001 -005 & 15-0041-001-005 BOTH REV.0	SBW	SAP		BTR	—	—
38	6/1/06	INC. DUN 15-0293-001 -002 REV.00	SBW	SAP		CDA	—	—
37	7/20/04	INC. DUN 11-0614-001 -005 REV.00	SBW	SAC		SSK	—	—
0	7/16/88	INFORMATION ONLY	HB	EWT	HRB	CML	JLL	MF

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	REV
OS-021 SH 1	39

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

Admin JPM
RO-A3

FOR TRAINING USE ONLY
VSDS Standard Map Survey Report
Survey DB-M-2018-TRG

General Information

Title: M-24 #2 ECCS

Survey Date/Time: 10/24/2017 12:58
Lead Surveyor: Tyler Brown
Survey Type: Monthly
Work Order/Task #: 1
Counted By:
SAP/Contract ID: C33087
RWP #: 2017-0001
Rx % Pwr: 100%
Status: Approved by: Tom Purdue, 10/31/2017 12:50:32
SAP/Contract ID: 10908
Ready for Review by: Tyler Brown, 10/24/2017 13:12:28
SAP/Contract ID: C33087

Dose Rate (DR) Object Prefixes/Suffixes

Dose Rates with Prefixes:
* = Contact
+ = 30cm

Dose Rates with No Prefixes:
Gen Area

Default Prefixes:
HS = Hot Spot

Default Suffixes:
"n" = Neutron
"b" = Beta
"c" = Corrected

Postings Legend

CA=Contaminated Area
RA=Radiation Area

Map Location

File Name	Image Description	Location Code	Bldg/Area Name	Location Description
AX\AUX545_Rm115ECCS2_M24	AUX545_Rm115ECCS2_M24	Auxiliary Building	AUX545	Rm115ECCS2_M24

Instruments Used

#	Instrument Model	Instrument Serial #	Calibration Date
1	S5XLB	2.12.56	4/16/2018
2	451B	2.7.535	1/19/2018

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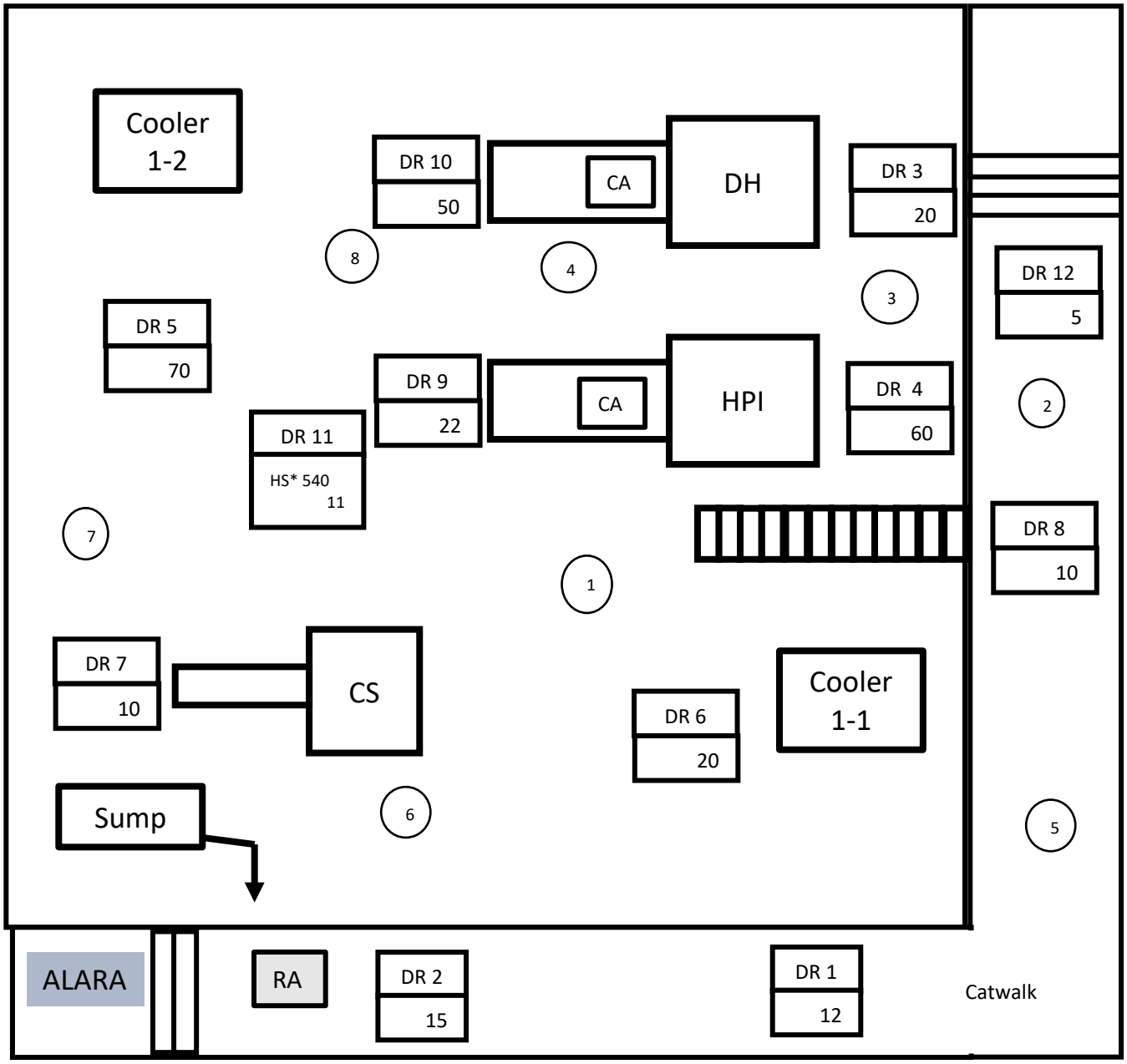
VSDS Standard Map Survey Report
Survey DB-M-2018-TRG



Comments: S5XLB MDA: Alpha 17 dpm, Beta 21 dpm

Smears 12-16: Post decon on and around drain cover. All <MDA alpha/beta.

Room was wet mopped and LAS of entire room passed SAM-11 tmp 10/31/2017

Type: Monthly

Symbol Legend (for example only)

Dose Rate
150 Contact Reading
75 30 cm Reading
20 General Area
HS-50 Hot Spot
RCA Posting
Drip Bag
15 Smear 15 Air Sample RM 15 Wipe

RWP #: 2017-0001
Reactor Power = 100%

Unless otherwise noted, dose rates in mrem/hr.

Lead Surveyor: Tyler Brown
Location Code: Auxiliary Building
Location Description: Rm115ECCS2_M24

Summary of Highest Readings
(All available values may not be listed)

Smears	Air Samples & Wipes
7) 587 DPM/100 cm2 β/γ	
10) <MDA DPM/100 cm2 α	

Status: Approved by: Tom Purdue, 10/31/2017 12:50:32
Bldg/Area Name: AUX545

Image File: AX\AUX545_Rm115ECCS2_M24

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VSDS Standard Map Survey Report
Survey DB-M-2018-TRG

#	Type	Inst.	Value	Units	Position	Notes
1	DR γ	N/A	12	mrem/hr		
2	DR γ	N/A	15	mrem/hr		
3	DR γ	N/A	20	mrem/hr		
4	DR γ	N/A	60	mrem/hr		
5	DR γ	N/A	70	mrem/hr		
6	DR γ	N/A	20	mrem/hr		
7	DR γ	N/A	10	mrem/hr		
8	DR γ	N/A	10	mrem/hr		
9	DR γ	N/A	22	mrem/hr		
10	DR γ	N/A	50	mrem/hr		
11	DR γ HS	N/A	HS * 540	mrem/hr	Hot Spot # 1	Elbow, placard reads *540 /11/@ 30 CM
		N/A	+11	mrem/hr		
12	DR γ	N/A	5	mrem/hr		

#	Type	Inst.	Value	Units	Position	Notes
1	Smear	N/A	β/γ 22	DPM/100 cm2	floor	
		N/A	α < MDA	DPM/100 cm2		
2	Smear	N/A	β/γ 47	DPM/100 cm2	floor	
		N/A	α < MDA	DPM/100 cm2		
3	Smear	N/A	β/γ 62	DPM/100 cm2	floor	
		N/A	α < MDA	DPM/100 cm2		
4	Smear	N/A	β/γ <MDA	DPM/100 cm2	floor	
		N/A	α < MDA	DPM/100 cm2		
5	Smear	N/A	β/γ 38	DPM/100 cm2	floor	
		N/A	α < MDA	DPM/100 cm2		
6	Smear	N/A	β/γ 38	DPM/100 cm2	floor	
		N/A	α < MDA	DPM/100 cm2		
7	Smear	N/A	β/γ 587	DPM/100 cm2	floor	
		N/A	α < MDA	DPM/100 cm2		
8	Smear	N/A	β/γ MDA	DPM/100 cm2	floor	
		N/A	α < MDA	DPM/100 cm2		

Examinee: _____ **Date:** _____

Examiner: _____

Facility: Davis-Besse **JPM No**: OPS-JPM-305

Task Title: Stay Time Calculation

Task No: 115-035-01-0100 **System:** _____

K/A Reference: 2.3.12 (3.2) **Safety Function:** _____

Time Critical Task: No **Alternate Path:** _____

Validation Time: 20 minutes

Method of testing:

Simulated Performance ___ Actual Performance X

Classroom X Simulator ___ Plant ___

Task Standard:
Determine the total dose received and the time required to receive an EAD Dose Alarm.

Required Materials:
Survey Map DB-M-2018-TRG
Calculator

General References:
None

Notes:
None

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

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

EXAMINER COPY

INITIAL CONDITIONS:

The plant is in procedure DB-OP-02527 Loss of Decay Heat Removal

- Refer to the Decay Heat Pump area Rad Pro Survey Map.
- You are to stage yourself **inside** the radiologically controlled area while awaiting directions.
- You are to remain in the area identified on the survey map with the lowest possible dose during the wait time.
- Your task will be to vent Decay Heat Pump 2 using vent valve DH56, DH PUMP 2 CASING VENT when directed.
- Your RWP has the following limits:
  - Dose Rate Alarm = 75 mrem/hr
  - Dose Alarm = 40 mrem

Aux Building 545 ECCS Room 2 is posted as a Radiation Area

Time line:
0800 – You enter ECCS Room 2 room and wait in the area identified on the survey map with the lowest possible dose
0830 – Wait time is complete, you start venting Decay Heat Pump 2
0855 – Venting is complete, you immediately exit the room and report back to the CTRM

INITIATING CUE:

Based upon the above timeline, the information from your RWP and the Aux Building 545 ECCS Room 2 survey map:

1. Determine the total amount of dose that was received from room entry to exit. Use the highest potential dose rate in the area of the pump in determining your dose for the actual venting portion of the entry.

2. Assuming no dose was received until you entered ECCS Room 2, determine the MAXIMUM time (including the wait time) you could take to vent the Decay Heat Pump 2 until you would receive an EAD Dose Alarm.

You do not have to include any dose received while transiting from the waiting area through the room to and from the pump.

(Provide examinee a copy of Survey Map DB-M-2018-TRG)

CANDIDATE COPY

INITIAL CONDITIONS:

The plant is in procedure DB-OP-02527 Loss of Decay Heat Removal

- Refer to the Decay Heat Pump area Rad Pro Survey Map.
- You are to stage yourself **inside** the radiologically controlled area while awaiting directions.
- You are to remain in the area identified on the survey map with the lowest possible dose during the wait time.
- Your task will be to vent Decay Heat Pump 2 using vent valve DH56, DH PUMP 2 CASING VENT when directed.
- Your RWP has the following limits:
  - Dose Rate Alarm = 75 mrem/hr
  - Dose Alarm = 40 mrem

Aux Building 545 ECCS Room 2 is posted as a Radiation Area

Time line:
0800 – You enter ECCS Room 2 room and wait in the area identified on the survey map with the lowest possible dose
0830 – Wait time is complete, you start venting Decay Heat Pump 2
0855 – Venting is complete, you immediately exit the room and report back to the CTRM

INITIATING CUE:

Based upon the above timeline, the information from your RWP and the Aux Building 545 ECCS Room 2 survey map:

1. Determine the total amount of dose that was received from room entry to exit. Use the highest potential dose rate in the area of the pump in determining your dose for the actual venting portion of the entry.

2. Assuming no dose was received until you entered ECCS Room 2, determine the MAXIMUM time (including the wait time) you could take to vent the Decay Heat Pump 2 until you would receive an EAD Dose Alarm.

You do not have to include any dose received while transiting from the waiting area through the room to and from the pump.

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 required unless denoted in the "Comments".

START TIME: _____

1. PERFORMANCE STEP: Determine the dose that will be received while waiting in the lowest dose waiting area in the radiologically controlled area.
.....C.....

STANDARD: Calculates the dose received for the duration of the time in the low dose area Map location DR12.

Based on a 30-minute wait at the area with a dose rate of 5 mrem/hr:

Low Dose Wait Area Dose: 5 mrem/hr X 0.5 hr = 2.5 mrem

COMMENT: Acceptable range is 2.5 to 3.0 mrem

CUE: **None**

SAT UNSAT

2. PERFORMANCE STEP: Determine the dose that will be received while venting the pump.
.....C.....

STANDARD: Calculates the dose received for the duration of the time venting the pump. Per the Survey Map location DR10 has the highest dose at 50 mrem/hr.

Based on a 25 minute task duration at the pump with a dose rate of 50 mrem/hr:

Pump Venting Dose: 50 mrem/hr X (25/60) hr = 20.83 mrem

COMMENT: Acceptable range is 20.8 to 21 mrem.

CUE: **None**

SAT UNSAT

3. PERFORMANCE STEP: Determine the Total dose that will be received while in the area performing the task.
.....C.....

STANDARD: Calculate the dose received for the duration of the task.

TOTAL Dose: 2.5 mrem + 20.83 mrem = 23.33 mrem

COMMENT: Acceptable range is 23.3 to 24.0 mrem

CUE: **None**

SAT UNSAT

4. PERFORMANCE STEP: Determine the maximum time to complete the task before reaching the EAD Dose Alarm setpoint.
.....C.....

STANDARD: Calculates the maximum time until Dose Alarm.

The RWP Dose Alarm setpoint is 40 mrem.

Subtract the low dose waiting area dose from the total allowed:
40 mrem – 2.5 mrem = 37.5 mrem

Vent Time Dose Rate is 50 mrem / hr:
37.5 mrem/ 50 mrem / hr = 0.75 hrs or 45 minutes

TOTAL Time is 45 minutes

COMMENT: Acceptable range is 44 to 45 minutes.

CUE: **None**

SAT UNSAT

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

END TIME: _____