

6/14/2013 14:33

# UNIT 1

Enclosure 3 to NL-13-1257

FNP-1-ESP-0.3

5-19-2010

Revision 13

FARLEY NUCLEAR PLANT

EVENT SPECIFIC PROCEDURE

FNP-1-ESP-0.3

NATURAL CIRCULATION COOLDOWN WITH ALLOWANCE FOR  
REACTOR VESSEL HEAD STEAM VOIDING (WITH RVLIS)

PROCEDURE USAGE REQUIREMENTS-per FNP-0-AP-6	SECTIONS
<b>Continuous Use</b>	<b>ALL</b>
<b>Reference Use</b>	
<b>Information Use</b>	

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Approved:

David L. Reed(for)

Operations Manager

Date Issued: 01/11/11

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REACTOR VESSEL HEAD STEAM VOIDING (WITH RVLIS)

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NATURAL CIRCULATION COOLDOWN WITH ALLOWANCE FOR  
REACTOR VESSEL HEAD STEAM VOIDING (WITH RVLIS)

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**A. Purpose**

This procedure provides actions to continue plant cooldown and depressurization to cold shutdown, with no accident in progress, under conditions that allow for the potential formation of a void in the upper head region with a vessel level system available to monitor void growth.

**B. Symptoms or Entry Conditions**

- I. This procedure is entered after completing the first ten steps of FNP-1-ESP-0.2 when the limits of FNP-1-ESP-0.2 must be exceeded; from the following:
  - a. FNP-1-ESP-0.2, NATURAL CIRCULATION COOLDOWN TO PREVENT REACTOR VESSEL HEAD STEAM VOIDING, step 11
  - b. FNP-1-ESP-0.2, NATURAL CIRCULATION COOLDOWN TO PREVENT REACTOR VESSEL HEAD STEAM VOIDING, step 14

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NATURAL CIRCULATION COOLDOWN WITH ALLOWANCE FOR  
REACTOR VESSEL HEAD STEAM VOIDING (WITH RVLIS)

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Step

Action/Expected Response

Response NOT Obtained

\*\*\*\*\*

CAUTION: [CA] To ensure proper plant response, FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION, must be entered upon any SI actuation.

\*\*\*\*\*

\*\*\*\*\*

CAUTION: The first ten steps of FNP-1-ESP-0.2, NATURAL CIRCULATION COOLDOWN TO PREVENT REACTOR VESSEL HEAD STEAM VOIDING must be performed before continuing with this procedure.

\*\*\*\*\*

\*\*\*\*\*

CAUTION: If RCP seal cooling had previously been lost, the affected RCP should not be started prior to a status evaluation.

\*\*\*\*\*

NOTE:

- FOLDOUT PAGE should be monitored continuously.
- To ensure adequate pressurizer spray, the priority for establishing RCP support conditions is 1B, 1A and then 1C.

\_\_\_ 1 [CA] Establish RCP support conditions.

Step 1 continued on next page.



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**Step****Action/Expected Response****Response NOT Obtained**

\*\*\*\*\*

CAUTION: To prevent heat exchanger damage, do not attempt restoration of RCP seal return flow unless the CCW miscellaneous header is aligned to an operating CCW loop.

\*\*\*\*\*

1.1 Verify CCW cooling -  
ESTABLISHED

1.1 Proceed to step 1.3.

1.1.1 Verify miscellaneous header  
aligned.

CCW TO  
SECONDARY HXS  
[] Q1P17MOV3047 open

1.1.2 Verify flow indicated in  
the On-Service train.

HX 1A(1B,1C)  
CCW FLOW  
[] FI 3043AA  
[] FI 3043BA  
[] FI 3043CA

1.2 Verify seal return flow -  
ESTABLISHED.

RCP SEAL WTR  
RTN ISO  
[] Q1E21MOV8100 open  
[] Q1E21MOV8112 open

1.3 Verify No. 1 seal support  
conditions established.

1.3.1 Maintain seal injection  
flow - GREATER THAN 6 gpm.

1.3.2 Verify No. 1 seal leakoff  
flow - WITHIN FIGURE 1  
LIMITS.

1.3.3 Verify No. 1 seal  
differential pressure -  
GREATER THAN 200 psid.

Step 1 continued on next page.

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Step	Action/Expected Response	Response NOT Obtained
1.4	Verify CCW aligned.  CCW FROM RCP THRM BARR [] Q1P17HV3045 open [] Q1P17HV3184 open	
1.5	Check RCP thermal barrier - INTACT.  RCP THRM BARR CCW FLOW HI [] Annunciator DD2 clear	1.5 Verify CCW flow isolated.  CCW FROM RCP THRM BARR [] Q1P17HV3045 closed [] Q1P17HV3184 closed
1.6	Verify at least one RCP bus - ENERGIZED.  [] 1A 4160 V bus [] 1B 4160 V bus [] 1C 4160 V bus	1.6 Proceed to step 1.11.
1.7	Check CCW to RCP oil coolers - SUFFICIENT.  CCW FLOW FROM RCP OIL CLRS LO [] Annunciator DD3 clear	1.7 Perform the following.  1.7.1 Verify CCW - ALIGNED.  CCW TO RCP CLRS [] Q1P17MOV3052 open  CCW FROM RCP OIL CLRS [] Q1P17MOV3046 open [] Q1P17MOV3182 open  1.7.2 <u>IF</u> annunciator DD3 clear, <u>THEN</u> proceed to step 1.8, <u>IF NOT</u> proceed to step 1.11.

Step 1 continued on next page.

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Step	Action/Expected Response	Response NOT Obtained
1.8	Check at least one RCP oil level - SUFFICIENT.  RCP 1A(1B,1C) BRG UPPER/LOWER OIL RES LO LVL [] Annunciator HH1 clear [] Annunciator HH2 clear [] Annunciator HH3 clear	1.8 Proceed to step 1.11.
1.9	Check RCS pressure - GREATER THAN 1850 psig.  1C(1A) LOOP RCS WR PRESS [] PI 402A [] PI-403A	1.9 <u>IF</u> RCS within FIGURE 2 limits, <u>THEN</u> proceed to step 1.10, <u>IF NOT</u> proceed to step 1.11.

Step 1 continued on next page.

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**Step****Action/Expected Response****Response NOT Obtained**

1.10 Check REACTOR VESSEL LEVEL  
indication - 100% UPPER HEAD.

1.10 Establish conditions to  
accommodate void collapse  
upon RCP start.

1.10.1 Raise pressurizer level to  
greater than 67% using  
charging and letdown.

- Raise charging flow.  
CHG FLOW  
[] FK 122 adjusted

- Reduce letdown flow.

1.10.2 Raise SUB COOLED MARGIN  
MONITOR indication to  
greater than 40°F  
subcooled in CETC mode.

1.10.2.1 Dump steam at a faster  
rate.

1.10.3 Use PZR heaters, as  
necessary to saturate the  
pressurizer water.

PRZR HTR GROUP  
VARIABLE

[] 1C

PRZR HTR GROUP  
BACKUP

[] 1A

[] 1B

[] 1D

[] 1E

Step 1 continued on next page.

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Step

Action/Expected Response

Response NOT Obtained

\*\*\*\*\*

CAUTION: Step 1.10 must be complete before starting any RCP.

\*\*\*\*\*

NOTE: Changes in RCP configuration may affect pressurizer spray flow.

1.11 [CA] IF support conditions  
exist to start an RCP  
THEN start at least one RCP.

1.11.1 Start bearing oil lift  
pump.

RCP  
OIL LIFT PUMP  
[] 1B(1A,1C)

1.11.2 Check oil lift pressure  
indicating light - LIT.

1.11.3 Start RCP.

RCP  
[] 1B(1A,1C)

1.11.4 WHEN RCP has operated for  
one minute,  
THEN stop bearing oil lift  
pump.

RCP  
OIL LIFT PUMP  
[] 1B(1A,1C)

1.12 [CA] IF at least one RCP  
started,  
THEN go to FNP-1-UOP-2.1,  
SHUTDOWN OF UNIT FROM MINIMUM  
LOAD TO HOT STANDBY.

1.11 Perform the following.

a) Continue efforts to  
establish RCP support  
conditions.

b) WHEN support conditions  
exist to start an RCP,  
THEN return to step 1.

c) Proceed to step 2.  
OBSERVE NOTE PRIOR TO  
STEP 2.

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Step	Action/Expected Response	Response NOT Obtained
<input type="checkbox"/>		
<p>NOTE: To prevent excessive pressure variations, saturated conditions should be established in the pressurizer prior to lowering pressurizer level.</p>		
<u>2</u>	<b>Establish pressurizer level to accommodate void growth.</b>	
2.1	Check pressurizer level - 25%-35%.	2.1 Control charging and letdown as necessary.
2.2	Place charging flow control in manual.	
	CHG FLOW <input type="checkbox"/> FK 122	
<u>3</u>	<b>[CA] Continue RCS cooldown.</b>	
3.1	[CA] Maintain RCS cold legs cooldown rate - LESS THAN 100°F IN ANY 60 MINUTE PERIOD.	
	RCS COLD LEG TEMP <input type="checkbox"/> TR 410	
3.2	[CA] Maintain SUB COOLED MARGIN MONITOR indication - GREATER THAN 36°F SUBCOOLED IN CETC MODE.	
3.3	[CA] Maintain RCS cold leg temperature and pressure - WITHIN FIGURE 3 LIMITS.	
	RCS COLD LEG TEMP <input type="checkbox"/> TR 410	
	1C(1A) LOOP RCS WR PRESS <input type="checkbox"/> PI 402A <input type="checkbox"/> PI 403A	



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Step

Action/Expected Response

Response NOT Obtained

NOTE: Reactor vessel steam voiding may occur during RCS pressure reduction.  
This will cause a rapid rise in pressurizer level.

## 4 Begin RCS pressure reduction.

4.1 IF normal letdown in service,  
THEN control auxiliary spray  
to reduce RCS pressure.

4.1 Open only one PRZR PORV to  
reduce RCS pressure.

4.2 Maintain RCS cold leg  
temperature and pressure -  
WITHIN FIGURE 3 LIMITS.

RCS COLD LEG TEMP

☐ TR 410

1C(1A) LOOP

RCS WR PRESS

☐ PI 402A

☐ PI 403A

## 5 [CA] Maintain pressurizer level 25%-90%.

5.1 Check pressurizer level -  
GREATER THAN 25%.

5.1 Raise pressurizer level using  
one or both of the following.

- Raise charging flow.

CHG FLOW

☐ FK 122 manually adjusted

- Reduce letdown flow.

Step 5 continued on next page.

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Step	Action/Expected Response	Response NOT Obtained
<input type="checkbox"/>		
5.2	Check pressurizer level - LESS THAN 90%.	5.2 Perform the following.
NOTE: The intent of step 5.2.1 is to maintain the pressurizer liquid at saturation temperature.		
		<p>5.2.1 Turn on additional pressurizer heaters.</p> <p>PRZR HTR GROUP VARIABLE</p> <p><input type="checkbox"/> 1C</p> <p>PRZR HTR GROUP BACKUP</p> <p><input type="checkbox"/> 1A</p> <p><input type="checkbox"/> 1B</p> <p><input type="checkbox"/> 1D</p> <p><input type="checkbox"/> 1E</p> <p>5.2.2 Reduce pressurizer level to less than 90% by one of the following.</p> <ul style="list-style-type: none"> <li>Control charging and letdown flow as necessary.</li> </ul> <p>Reduce charging flow</p> <p>CHG FLOW</p> <p><input type="checkbox"/> FK 122 manually adjusted</p> <p>Raise letdown flow.</p> <p><u>OR</u></p> <ul style="list-style-type: none"> <li>Continue RCS cooldown to shrink inventory.</li> </ul>



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Step	Action/Expected Response	Response NOT Obtained
<input type="checkbox"/>		
6	[CA] Check REACTOR VESSEL LEVEL indication - GREATER THAN 44% UPPER PLENUM.	<p>6 Perform the following.</p> <p>6.1 Raise RCS pressure.</p> <p>6.1.1 Turn on additional pressurizer heaters.</p> <p>PRZR HTR GROUP VARIABLE [] 1C</p> <p>PRZR HTR GROUP BACKUP [] 1A [] 1B [] 1D [] 1E</p> <p>6.2 Return to step 3.</p>
7	Check when to isolate SI accumulators.	
7.1	Check power to discharge valves - AVAILABLE.	7.1 Close accumulator discharge valve disconnects using ATTACHMENT 1.
	1A(1B,1C) ACCUM DISCH ISO [] Q1E21MOV8808A [] Q1E21MOV8808B [] Q1E21MOV8808C	
7.2	[CA] <u>WHEN</u> RCS pressure less than 1000 psig. <u>THEN</u> close all SI accumulator discharge valves.	7.2 Vent any SI accumulator that cannot be isolated.
	1A(1B,1C) ACCUM DISCH ISO [] Q1E21MOV8808A [] Q1E21MOV8808B [] Q1E21MOV8808C	<p>ACCUM N2 VENT [] HIK 936 open</p>

SI ACCUM	1A	1B	1C
1A(1B,1C) ACCUM N2 SUPP/VT ISO Q1E21HV	<p>[] 8875A open</p>	<p>[] 8875B open</p>	<p>[] 8875C open</p>

Step 7 continued on next page.

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Step	Action/Expected Response	Response NOT Obtained
<input type="checkbox"/>		
7.3	[CA] <u>WHEN</u> SI accumulator discharge valves closed, <u>THEN</u> open and lock accumulator discharge valve disconnects using ATTACHMENT 2.	
<u>8</u>	[CA] Maintain letdown flow.	
8.1	<u>WHEN</u> letdown flow less than required, <u>THEN</u> open additional letdown orifice isolation valves.	
	LTDN ORIF ISO 45 GPM [] Q1E21HV8149A	
	LTDN ORIF ISO 60 GPM [] Q1E21HV8149B [] Q1E21HV8149C	
	<u>OR</u>	
8.2	<u>WHEN</u> letdown flow less than required, <u>THEN</u> adjust low pressure letdown control valve.	
	LP LTDN PRESS [] PK 145	
<u>9</u>	[CA] Maintain seal injection flow to each RCP - 6-13 gpm.	
	SEAL WTR INJECTION [] HIK 186 adjusted	

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Step	Action/Expected Response	Response NOT Obtained
<u>10</u>	<b>Check if RHR system can be placed in service.</b>	
10.1	Check RCS hot leg temperatures - LESS THAN 350°F.  RCS HOT LEG TEMP [] TR 413	10.1 Return to step 3.
10.2	Check RCS narrow range pressure - LESS THAN 350 psig.  1C(1A) LOOP RCS NR PRESS [] PI 402B [] PI 403B	10.2 Return to step 3.
10.3	Place RHR system in service using FNP-1-SOP-7.0, RESIDUAL HEAT REMOVAL SYSTEM.	
<u>11</u>	<b>[CA] Continue RCS cooldown to cold shutdown with RHR.</b>	
*****		
<p><u>CAUTION:</u> Reactor vessel steam voiding may occur if the RCS is depressurized before the entire RCS is cooled to less than 200°F.</p>		
*****		
<u>12</u>	<b>[CA] Continue cooldown of inactive portion of RCS.</b>	
12.1	Maintain RCS pressure - 350-400 psig.  1C(1A) LOOP RCS NR PRESS [] PI 402B [] PI 403B	
12.2	Verify both CRDM FANs - STARTED.	
12.3	Continue dumping steam from all SGs.	
12.4	Check REACTOR VESSEL LEVEL indication - 100% UPPER HEAD.	12.4 Return to step 11.

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Step	Action/Expected Response	Response NOT Obtained
<div style="border: 1px solid black; width: 40px; height: 20px; margin-bottom: 5px;"></div> 13	Check if RCS depressurization is permitted.	
NOTE: FNP-1-SOP-68.0, INADEQUATE CORE COOLING MONITORING SYSTEM provides detailed operating instructions for the core exit T/C monitor.		
13.1	Check reactor vessel upper head temperature - LESS THAN 200°F.  CORE EXIT THERMOCOUPLE MONITOR [] TRAIN A (Points 4,7,9, 15,16,17,24,26) [] TRAIN B (Points 2,3,6,12)	13.1 Return to step 11.
13.2	Check all atmospheric relief valves - OPEN.  1A(1B,1C) MS ATMOS REL VLV [] PC 3371A [] PC 3371B [] PC 3371C	13.2 Perform the following.  13.2.1 Direct counting room to perform FNP-0-CCP-645, MAIN STEAM ABNORMAL ENVIRONMENTAL RELEASE.  13.2.2 Open all atmospheric relief valves.  1A(1B,1C) MS ATMOS REL VLV [] PC 3371A [] PC 3371B [] PC 3371C
13.3	Locally check SGs - NOT STEAMING.	13.3 Return to step 11.
13.4	Go to FNP-1-UOP-2.2, SHUTDOWN OF UNIT FROM HOT STANDBY TO COLD SHUTDOWN.	
-END-		

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START STEPCONTINUOUS ACTION

- ☐ CAUTION [CA] To ensure proper plant response,  
FNP-1-EEP-0, REACTOR TRIP OR SAFETY INJECTION, must be  
entered upon any SI actuation.
- 1 [CA] Establish RCP support conditions.
- 1.11 [CA] IF support conditions exist to start an RCP THEN  
start at least one RCP.
- 1.12 [CA] IF at least one RCP started, THEN go to  
FNP-1-UOP-2.1, SHUTDOWN OF UNIT FROM MINIMUM LOAD TO HOT  
STANDBY.
- ☐ 3 [CA] Continue RCS cooldown.
- 3.1 [CA] Maintain RCS cold legs cooldown rate - LESS THAN  
100F IN ANY 60 MINUTE PERIOD.
- 3.2 [CA] Maintain SUB COOLED MARGIN MONITOR indication -  
GREATER THAN 36F SUBCOOLED IN CETC MODE.
- 3.3 [CA] Maintain RCS cold leg temperature and pressure -  
WITHIN FIGURE 3 LIMITS.
- ☐ 5 [CA] Maintain pressurizer level 25%-90%.
- ☐ 6 [CA] Check REACTOR VESSEL LEVEL indication - GREATER THAN 44% UPPER  
PLENUM.
- ☐ 7 7.2 [CA] WHEN RCS pressure less than 1000 psig, THEN close all  
SI accumulator discharge valves.
- 7.3 [CA] WHEN SI accumulator discharge valves closed, THEN open  
and lock accumulator discharge valve disconnects using  
ATTACHMENT 2.
- ☐ 8 [CA] Maintain letdown flow.
- ☐ 9 [CA] Maintain seal injection flow to each RCP - 6-13 gpm.
- ☐ 11 [CA] Continue RCS cooldown to cold shutdown with RHR.

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START   STEPCONTINUOUS ACTION☐

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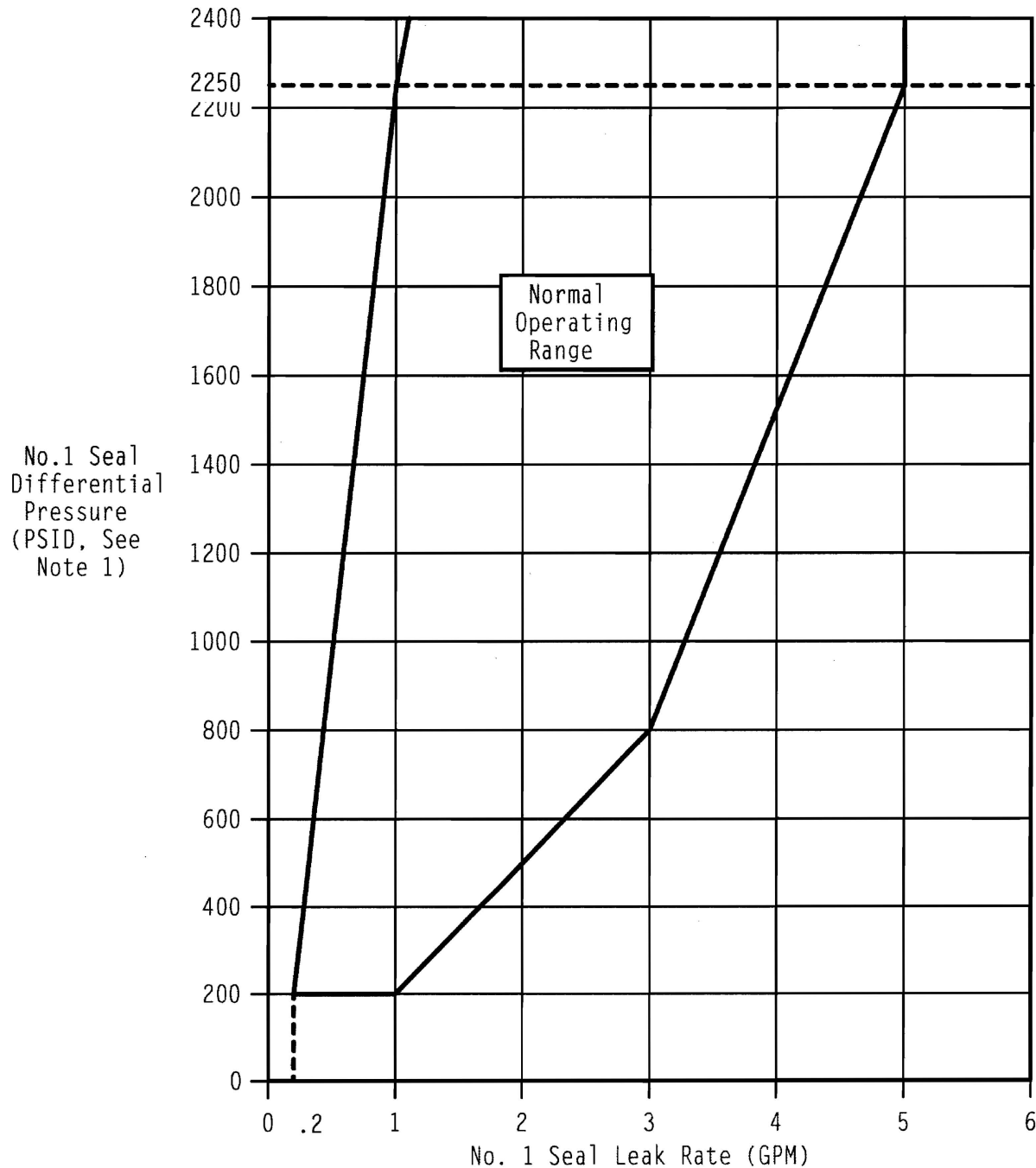
[CA] Continue cooldown of inactive portion of RCS.

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FIGURE 1

## NO. 1 SEAL NORMAL OPERATING RANGE



Note 1: For No. 1 Seal Differential Pressures greater than 400 psid, use RCS pressure in psig.



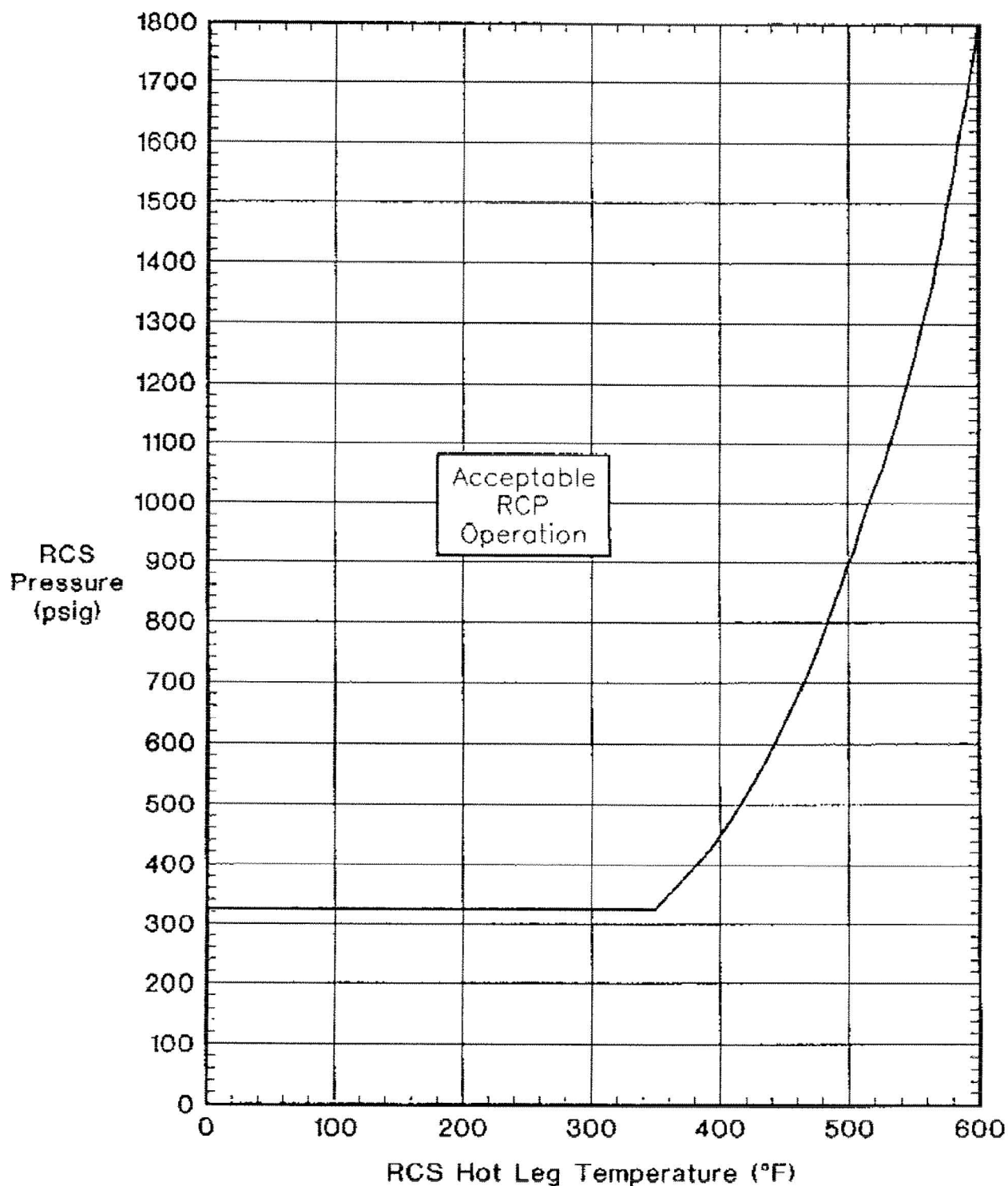
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FIGURE 2

RCP PRESSURE-TEMPERATURE OPERATING LIMITS





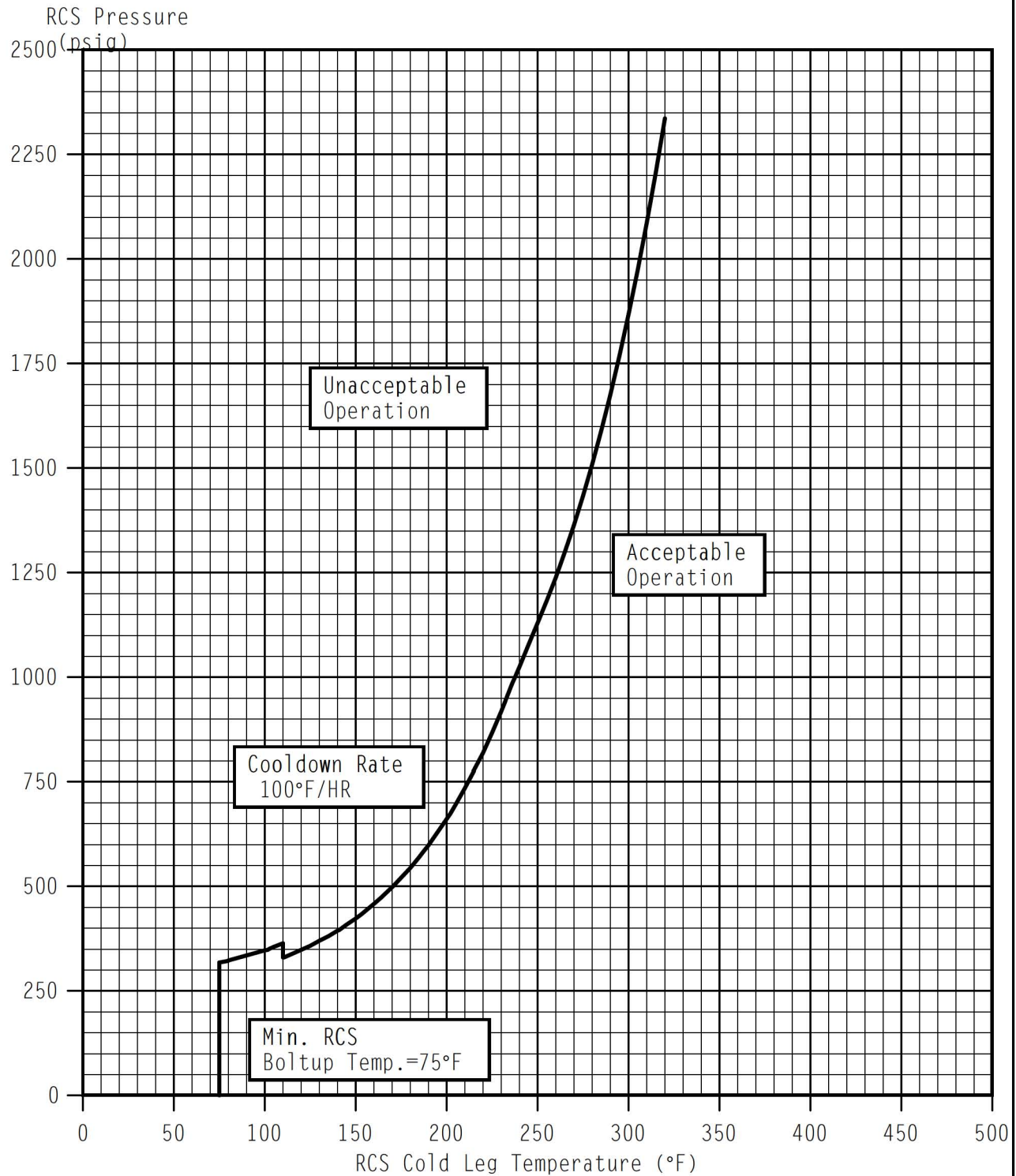
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FIGURE 3

UNIT 1 100°F/HR TECH. SPEC. LIMIT RCS COOLDOWN



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Step

Action/Expected Response

Response NOT Obtained

## ATTACHMENT 1

- 1 Close the following disconnects.

'A' Train Disconnects				
Disconnect TPNS No.	Description	Position	Key	Location
Q1R18B031-A	Disconnect FU-Z3 MOV 8808C-A	ON	Z-85	139' hallway-across from MCC 1A
Q1R18B032-A	Disconnect FU-Z2 MOV 8888A-A	ON	Z-84	

'B' Train Disconnects				
Disconnect TPNS No.	Description	Position	Key	Location
Q1R18B035-B	Disconnect FV-S2 MOV 8808B-B	ON	Z-86	139' hallway-across from chemistry sample room

- 2 Verify accumulator discharge valves MCB indication - POWER AVAILABLE.

1A(1B,1C) ACCUM  
DISCH ISO

- ☐ Q1E21MOV8808A  
☐ Q1E21MOV8808B  
☐ Q1E21MOV8808C

- 3 Notify control room of accumulator discharge valve disconnect status.

-END-

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Step

Action/Expected Response

Response NOT Obtained

## ATTACHMENT 2

- 1 Open and lock the following disconnects.

'A' Train Disconnects				
Disconnect TPNS No.	Description	Position	Key	Location
Q1R18B031-A	Disconnect FU-Z3 MOV 8808C-A	LOCKED OPEN	Z-85	139' hallway- across from MCC 1A
Q1R18B032-A	Disconnect FU-Z2 MOV 8808A-A	LOCKED OPEN	Z-84	

'B' Train Disconnects				
Disconnect TPNS No.	Description	Position	Key	Location
Q1R18B035-B	Disconnect FV-S2 MOV 8808B-B	LOCKED OPEN	Z-86	139' hallway- across from chemistry sample room

- 2 Notify control room of accumulator discharge valve disconnect status.

-END-

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Step	Action/Expected Response	Response NOT Obtained
1	<u>Monitor SI criteria.</u>	
1.1	Greater than 16°F subcooled in CETC mode and PRZR level above 4%.	1.1 Verify SI actuated <u>AND</u> go to FNP-1-EEP-0.
2	<u>Monitor switchover criteria.</u>	
2.1	CST level greater than 5.3 ft.	2.1 Align AFW pumps suction to SW using FNP-1-SOP-22.0.