# TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F

AOI 4.2.3 REV. 5

# **TABLE OF CONTENTS**

| STEP NO                | <u>DESCRIPTION</u>              | <u>PAGE NO</u> |
|------------------------|---------------------------------|----------------|
| 1.0PURPOSE             |                                 | 1              |
| 2.0 SYMPTOMS/ENTRY CO  | ONDITIONS                       | 1              |
| 3.0 AUTOMATIC ACTIONS  |                                 | 1              |
| 4.0 IMMEDIATE OPERATOR | R ACTIONS                       | 1              |
| 5.00PERATOR ACTIONS    |                                 | 2              |
| 6.0REFERENCES          |                                 | 20             |
| ATTACHMENT 1 COLD LE   | G RECIRCULATION USING RHR PUMPS | S              |
| ATTACHMENT 2 480V BUS  | EQUIPMENT LOAD RATINGS          | 23             |

| Number:   | Title:  | Revision: |
|-----------|---|-----------|
| AOI 4.2.3 | TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS<br>TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F | REV. 5    |

### 1.0 PURPOSE

1.1. This AOI is for use during a LOCA that began when RCS temperature was less than 350°F AND greater than or equal to 200°F. It provides guidance to the operators for transferring to Cold Leg Recirculation, sampling the water in Containment, with guidance for pH control, guidance for other post-accident Containment samples AND guidance for Hydrogen inventory control in Containment.

### 2.0SYMPTOMS/ENTRY CONDITIONS

- 2.1. RWST LEVEL LOW LOW 9.24 FT Alarm (Window 3-8 or 4-8) on Panel SBF-2.
- 2.2. RWST level indicates less than 9.24 feet on Panel SB-1 OR Panel AS-3.

### **3.0 AUTOMATIC ACTIONS**

None

### **4.0 IMMEDIATE OPERATOR ACTIONS**

None

| Number:   | Title:   | Revision: |
|-----------|--|-----------|
| AOI 4.2.3 | TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F | REV. 5    |

|      |                          | particular to the second of th |
|------|--------------------------|--|
| STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED  |
|      |                          |  |

### 5.0 OPERATOR ACTIONS

#### NOTE

Adverse Containment conditions are in effect if Containment radiation levels ever exceed 1E5 R/hr OR Containment pressure remains above 4 psig.

1. CHECK plant status

- 1. RETURN to procedure AND step in effect
- RWST level LESS THAN 9.24 FEET

<u>AND</u>

- Safety Injection ALIGNED TO RWST
- 2. CHECK RWST level GREATER THAN 3 FEET
- WHEN RWST level less than 3 feet, STOP <u>ALL</u> pumps taking a suction on the RWST

#### CAUTION

- Steps 3 through 37 SHALL be performed without delay.
- SI Recirculation flow to the RCS SHALL be maintained at all times.
- <u>IF</u> offsite power is lost <u>AFTER</u> SI has been reset, manual action may be required to restart safeguards equipment.
- 3. CHECK SI RESET

- 3. PERFORM the following:
  - a. PLACE SIA Normal/Defeat switches in DEFEAT (SB-2)
    - SIA-1 TRAIN-A
    - SIA-2 TRAIN-B

| Number:   | Title:   | Revision: |
|-----------|--|-----------|
| AOI 4.2.3 | TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F | REV. 5    |

| STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED |      |                          |                       |
|---|------|--------------------------|-----------------------|
|   | STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |

- pushbuttons (SB-2)
  - TRAIN A
  - TRAIN B

- PRIOR to dispatching personnel to perform local actions, an evaluation of local environmental conditions, including radiation SHALL be made.
- Do <u>NOT</u> energize MOV-894A, MOV-894B, MOV-894C or MOV-894D breakers <u>UNLESS</u> specifically directed to reposition the associated valves.
- 4. CHECK SI Accumulators ISOLATED
- 4. ISOLATE SI Accumulators as follows
  - a. ENERGIZE SI Accumulator Outlet Stop breakers
    - MOV-894A
    - MOV-894B
    - MOV-894C
    - MOV-894D
  - b. CLOSE SI Accumulator Outlet Stops
    - MOV-894A
    - MOV-894B
    - MOV-894C
    - MOV-894D
  - c. DE-ENERGIZE SI Accumulator Outlet Stop breakers
    - MOV-894A
    - MOV-894B
    - MOV-894C
    - MOV-894D

| Number:   | Title:   | Revision: |
|-----------|--|-----------|
| AOI 4.2.3 | TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F | REV. 5    |

| 1 1   |                            |                         |
|-------|----------------------------|-------------------------|
| ISTEP | ACTION/EXPECTED RESPONSE   | RESPONSE NOT OBTAINED   |
|       | ACTION/EXI ECTED NEGI ONGE | I TEOLONGE NOT OBTAINED |
|       |                            |                         |

- d. IF unable to isolate an SI Accumulator, VENT the affected accumulator
  - 1. VERIFY PCV-863, Accumulator N<sub>2</sub> Supply Line Stop, CLOSED
  - 2. IF unable to close PCV-863, CLOSE Accumulator N<sub>2</sub> **Supply Root Stops** 
    - 1811A
    - 1811B
  - **OPEN affected Accumulator** 3. Gas Stop
    - 891A
    - 891B
    - 891C
    - 891D
  - OPEN HCV-943, 4. Accumulators N<sub>2</sub> Vent Controller to 100 percent

- 5. ENERGIZE ALL remaining MOVs
  - MCC 26A
  - MCC 26AA
  - **MCC 26B**
  - MCC 26BB
- 6. STOP ALL Charging Pumps
- 7. VERIFY Auxiliary Component Cooling 7. START BOTH ACC Pumps **Pumps - RUNNING**

| Number:   | Title:   | Revision: |
|-----------|--|-----------|
| AOI 4.2.3 | TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F | REV. 5    |

| STEP ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|-------------------------------|-----------------------|
|-------------------------------|-----------------------|

- The SI pumps SHALL be stopped if RCS pressure is greater than their shutoff head pressure.
- IF the flow path from the sump to the RCS CANNOT be established OR maintained during this procedure, AOI 4.2.5, Loss of Emergency Coolant Recirculation During LOCA When RCS Temperature at Least 200°F and less than 350°F, SHALL be performed.
- 8. PLACE Safety Injection Recirc Switch 1 to ON
  - (a) CHECK 22 SI Pump - STOPPED
- (a) IF three SI pumps running, STOP 22 SI Pump
- VERIFY 22 SI Pump Suctions -(b) **CLOSED**
- (b) CLOSE 22 SI Pump Suctions

MOV-887A

MOV-887A

MOV-887B

MOV-887B

- 9. PLACE Safety Injection Recirc Switch 3 to ON
  - (a) VERIFY <u>BOTH</u> RHR Pumps - (a) TRIP <u>BOTH</u> RHR Pumps TRIPPED
  - (b) **VERIFY RHR Pump Suction AND Discharge Stops - CLOSED** 
    - MOV-882
    - **MOV-744**

| Number:   | Title:  | Revision: |
|-----------|---|-----------|
| AOI 4.2.3 | TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS<br>TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F | REV. 5    |

| STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED |  |
|---|--|
|---|--|

The load on the EDGs should remain less than 1750KW, but may be increased to 2100KW for a maximum of 2 hours in any 24 hour period.

#### NOTE

It is acceptable for the EDG load to increase to 2300KW during performance of the recirculation switch sequence. Attachment 1 should be referred to for 480V equipment load ratings.

# 10. PLACE Safety Injection Recirc Switch 2 to ON

(a) CHECK Service Water non-essential header - ONE PUMP OPERATING

### (a) PERFORM the following:

- IF non-essential header is 1-2-3, START 22, 23 OR 21 SW pump (preferred order)
- 2. <u>IF non-essential header is</u> 4-5-6, START 25, 26 <u>OR</u> 24 SW pump (preferred order)
- (b) VERIFY non-essential SW to conventional header ISOLATED
  - (1) CHECK FCV-1111, Service Water Conventional from Header 4 - CLOSED
- (1) CLOSE FCV-1111

- (2) CHECK FCV-1112, Service Water Conventional from Header 1 - CLOSED
- (2) CLOSE FCV-1112

- (3) CHECK SWN-6, Oil Coolers Supply from Header 4 - CLOSED
- (3) CLOSE SWN-6

| Number:   | Title:   | Revision: |
|-----------|--|-----------|
| AOI 4.2.3 | TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F | REV. 5    |

| STEP     | A   | CTION | /EXPECTED RESPONSE  |  | RESI | PONSE NOT OBTAINED  |
|----------|-----|-------|---|--|------|---|
| <u> </u> |     |       |   | <b>I</b>   |      |   |
|          |     | (4)   | CHECK SWN-7, Oil<br>Coolers Supply from<br>Header 1 - CLOSED  | (4)  | CLC  | OSE SWN-7   |
|          | (c) | CHEC  | CK <u>ONE</u> CCW Pump -<br>NING                              | (c) START 22, 21, or 23 CCW PUMP (preferred order) |      |   |
|          | (d) | - LES | CK River Water Temperature<br>S THAN <u>OR</u><br>AL TO 85 °F |  |      | <b>;</b>  |
|          |     | (1)   | START second CCW<br>Pump                                      | (1)  |      | OSE 804, Spent Fuel Pit Heat hanger Outlet Stop   |
|          | 11. |       | CK Containment level -  | 11.  | PE   | RFORM <u>BOTH</u> of the following:   |
|          |     |       | OR L-941  |  | a.   | IF containment level increases to greater than 47' 10", immediately RETURN to this step   |
|          |     |       |   |  |      | AND   |
|          |     |       |   |  | b.   | GO TO AOI 4.2.5, Loss of<br>Emergency Coolant Recirculation<br>During LOCA When RCS Temperature<br>at Least 200°F and less than 350°F |
|          | 12. |       | E Safety Injection Recirc<br>h 4 to ON                        |  |      |   |
|          |     | (a)   | VERIFY 21 Recirculation<br>Pump - RUNNING                     | (a)  | PEF  | RFORM the following:  |
|          |     |       |   |  | a.   | START 22 Recirculation Pump   |
|          |     |       |   |  | b.   | IF no Recirculation Pump will start, PERFORM Attachment 1, Cold Leg Recirculation Using RHR Pumps                                     |
|          |     |       |   |  |      |   |

| Number:   | Title:   | Revision: |
|-----------|--|-----------|
| AOI 4.2.3 | TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F | REV. 5    |

| CTED |     | ACTION | I/CVDI | FOTER PERPONEE                               |                       | DESD | ONC | NOTOPTAINED                          |  |
|------|-----|--------|--------|--|-----------------------|------|-----|--------------------------------------|--|
| STEP |     | ACTION | VEXP   | ECTED RESPONSE                               | RESPONSE NOT OBTAINED |      |     |                                      |  |
|      |     | (b)    |        | CK Recirculation<br>p Discharge Stops -<br>N |                       | (b)  |     | EN Recirculation Pump<br>harge Stops |  |
|      |     |        | •      | MOV-1802A                                    |                       |      | •   | MOV-1802A                            |  |
|      |     |        | •      | MOV-1802B                                    |                       |      | •   | MOV-1802B                            |  |
|      | 13. | recir  |        | low-head cold leg<br>on has been<br>d        |                       |      |     |                                      |  |
|      |     | (a)    |        | ERMINE required core ng flow from table w:   |                       |      |     |                                      |  |

| No. of 946A-D Flow<br>Indicators Greater<br>Than 400 gpm | Core Flow Rate<br>on Indicators Greater<br>Than 400 gpm   |
|--|---|
| 4  | Lowest of these indicators - GREATER THAN 630 GPM OR Sum of two lowest of these indicators - GREATER THAN 950 GPM |
| 3  | Lowest of these indicators - GREATER THAN 630 GPM OR Sum of two lowest of these indicators - GREATER THAN 950 GPM |
| 2  | EACH GREATER THAN 500 GPM   |
| 1 <u>OR</u> None   | Required Core Cooling - NOT MET   |

- (b) Core cooling flow required by table ESTABLISHED
- (b) ESTABLISH high-head cold leg recirculation, GO TO Step 24

| Number | r:    |
|--------|-------|
| AOI    | 4.2.3 |

Title:

TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F

Revision:

REV. 5

| STEP | A          | CTION/EXPECTED RESF  | PONSE      | RESPONSE NOT OBTAINED |
|------|------------|--|------------|-----------------------|
|      | 4.4        |  | Darling    |                       |
|      | 14.        | PLACE Safety Injection<br>Switch 7 to ON                                 | Recirc     |                       |
|      |            | (a) CHECK ALL SI PU<br>TRIPPED   | ımps - (a) | TRIP ALL SI Pumps     |
|      |            | (b) CHECK MOV-887<br>CLOSED  | 'A - (b)   | CLOSE MOV-887A        |
|      |            | (c) CHECK MOV-887<br>CLOSED  | B - (c)    | CLOSE MOV-887B        |
|      | <b>15.</b> | PLACE Safety Injection<br>Switch 8 to ON                                 | Recirc     |                       |
|      |            | (a) CHECK the follow valves - CLOSED                                     | ing (a)    | Manually CLOSE valves |
|      |            | <ul><li>MOV-1810,</li><li>Pump Sucti<br/>RWST</li></ul>                  |            |                       |
|      |            | <ul><li>SOV-1813,</li><li>Containmer</li><li>Pump Test</li></ul>         | nt Spray   |                       |
|      | 16.        | CHECK <u>ALL</u> 480V AC b<br>powered from <u>ONE</u> of t<br>following: |            | GO TO Step 21         |
|      |            | <ul> <li>Emergency Diese</li> <li>Generators</li> </ul>                  | 1          |                       |
|      |            | Off-site power   |            |                       |

| ĺ | Number:   | Title:  | Revision: |
|---|-----------|---|-----------|
|   | AOI 4.2.3 | TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS<br>TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F | REV. 5    |

| STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|------|--------------------------|-----------------------|

<u>IF</u> recirculation flow has been reduced to one recirculation pump, the operator SHALL monitor recirculation flow <u>AND</u> start the idle pump, <u>IF</u> the running pump is lost.

- 17. PLACE Safety Injection Recirc Switch 5 to ON
- 18. CHECK Service Water non-essential header TWO PUMPS OPERATING
- 18. PERFORM the following:
  - a. Manually START one NESW pump in preferred order.
    - 22, 23, 21 pump <u>IF</u>
       non-essential header is
       1-2-3
    - 25, 26, 24 pump <u>IF</u>
       non-essential header is
  - b. <u>IF ONLY one Service Water</u> pump operating, PERFORM the following:
    - 1. <u>IF</u> both recirculation pumps running, STOP one recirculation pump
    - 2. CLOSE 804, Spent Fuel Pit Heat Exchanger Outlet Stop

- 19. CHECK CCW TWO PUMPS OPERATING
- 19. PERFORM the following:
  - a. START 22, 21 <u>OR</u> 23 CCW Pump (preferred order)
  - b. <u>IF ONLY one CCW pump</u> operating <u>AND</u> two recirculation pumps operating, STOP one recirculation pump

| Number:   | Title:   | Revision: |
|-----------|--|-----------|
| AOI 4.2.3 | TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F | REV. 5    |

| STEP | A   | CTION                                    | l/EXPE             | CTED RESPONSE                              |     | RESP | ONSE    | NOT OBTAINED                  |
|------|-----|--|--------------------|--|-----|------|---------|-------------------------------|
|      |     |  |                    |  | 1   |      | <b></b> |                               |
|      | 20. | VERIFY 22 Recirculation Pump - OPERATING |                    |  | 20. | STAI | RT 21   | Recirculation Pump            |
|      | 21. | Minir                                    |                    | CLOSE RHR<br>low Test Line Stops           |     |      |         |                               |
|      |     | •  | MOV                | -743                                       |     |      |         |                               |
|      |     | •  | MOV                | -1870                                      |     |      |         |                               |
|      |     |  |                    |  |     |      |         |                               |
|      | 22. | CLOS<br>RWS                              |                    | Test Line Stops to                         |     |      |         |                               |
|      |     | (a)                                      | PLAC<br>to OF      | E interlock switches<br>F                  |     |      |         |                               |
|      |     |  | •                  | MOV-842                                    |     |      |         |                               |
|      |     |  | •                  | MOV-843                                    |     |      |         |                               |
|      |     | (b)                                      | CLOS<br>to RV      | SE SI Test Line Stops<br>VST               |     |      |         |                               |
|      |     |  | •                  | MOV-842                                    |     |      |         |                               |
|      |     |  | •                  | MOV-843                                    |     |      |         |                               |
|      | 23. | GO T                                     | O Ste              | 37   |     |      |         |                               |
|      | 24. |  | CE Safe<br>ch 6 to | ety Injection Recirc<br>ON                 |     |      |         |                               |
|      |     | (a)                                      | -                  | CK RHR Heat<br>anger Outlet Stops -<br>SED |     | (a)  |         | SE RHR Heat Exchanger t Stops |
|      |     |  | •                  | MOV-746                                    |     |      | •       | MOV-746                       |
|      |     |  | •                  | MOV-747                                    |     |      | •       | MOV-747                       |
|      |     |  |                    | ·  |     |      |         |                               |

| Number:   | Title:  | Revision: |
|-----------|---|-----------|
| AOI 4.2.3 | TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS<br>TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F | REV. 5    |

|      |     |            |               |  |          | •                          |
|------|-----|------------|---------------|--|----------|----------------------------|
| STEP | A   | CTION      | V/EXPE        | CTED RESPONSE  | <u> </u> | RESPONSE NOT OBTAINED      |
|      | 25. |            |               | ve alignment   |          |                            |
|      |     | AND<br>(a) | CHEC<br>Excha | e to start SI pump  CK RHR Heat  anger Outlet to SI  Suction Stops - | (a)      | OPEN MOV-888A and MOV-888B |
|      |     |            | •             | MOV-888A<br>MOV-888B   |          |                            |
|      | 26. | CLO:       |               | est Line Stops to  |          |                            |
|      |     | (a)        | PLAC<br>to OF | E interlock switches<br>F  |          |                            |
|      |     |            | •             | MOV-842  |          |                            |
|      |     |            | •             | MOV-843  |          |                            |
|      |     | (b)        | CLOS<br>to RW | SE SI Test Line Stops<br>/ST   |          |                            |
|      |     |            | •             | MOV-842  |          |                            |
|      |     |            | •             | MOV-843  |          |                            |
|      | 27. | Pres       |               | n Head Low Suction<br>arm Switch to ON<br>)                          |          |                            |

| Number:   | Title:   | Revision: |
|-----------|--|-----------|
| AOI 4.2.3 | TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F | REV. 5    |

| STEP | Α   | CTION/EXPECTED RESPONSE                |     | RESP | ONSE       | NOT OBTAINED  |
|------|-----|--|-----|------|------------|---|
|      | 28. | CHECK SI Pumps - AT LEAST 2<br>RUNNING | 28. | PER  | FORM       | I the following:  |
|      |     |  |     | a.   |            | IFY Safety Injection<br>rc Switch 7 is OFF  |
|      |     |  |     | b.   | STAF       | RT two SI Pumps   |
|      |     |  |     |      | •          | 21 SI Pump  |
|      |     |  |     |      | •          | 23 SI Pump  |
|      |     |  |     | C.   | <u>NOT</u> | Pump 21 <u>OR</u> 23 can<br>be started, PERFORM<br>ollowing:                            |
|      |     |  |     |      | 1.         | PLACE Safety Injection<br>Recirc Switch 1 to OFF  |
|      |     |  |     |      | 2.         | OPEN 22 SI Pump<br>Suctions   |
|      |     |  |     |      |            | • MOV-887A  |
|      |     |  |     |      |            | • MOV-887B  |
|      |     |  |     |      | 3.         | START 22 SI Pump  |
|      |     |  |     |      | 4.         | IF 21 SI Pump NOT running, CLOSE MOV-851B, 22 SI Pump Tie Valve to Outlet of 23 SI Pump |
|      |     |  |     |      | 5.         | IF 23 SI Pump NOT running, CLOSE MOV-851A, 22 SI Pump Tie Valve to Outlet of 21 SI Pump |

| Number:   | Title:   | Revision: |
|-----------|--|-----------|
| AOI 4.2.3 | TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F | REV. 5    |

| <u></u> |     |       |  |     |                       |
|---------|-----|-------|--|-----|-----------------------|
| STEP    | A   | CTION | N/EXPECTED RESPONSE  |     | RESPONSE NOT OBTAINED |
|         | 29. | Minir | ALLY CLOSE RHR<br>mum Flow Test Line Stops<br>t PAB)                             |     |                       |
|         |     | •     | MOV-743  |     |                       |
|         |     | •     | MOV-1870   |     |                       |
|         | 30. |       | CE Safety Injection Recirc<br>ch 8 to ON   |     |                       |
|         |     | (a)   | CHECK the following valves - CLOSED  | (a) | Manually CLOSE valves |
|         |     |       | <ul> <li>MOV-1810, SI</li> <li>Pump Suction from</li> <li>RWST</li> </ul>        |     |                       |
|         |     |       | <ul> <li>SOV-1813,</li> <li>Containment Spray</li> <li>Pump Test Line</li> </ul> |     |                       |
|         | 31. | powe  | CK <u>ALL</u> 480V AC buses<br>ered from <u>ONE</u> of the<br>wing:              | 31. | GO TO Step 37         |
|         |     | •     | Emergency Diesel<br>Generators   |     |                       |

<u>CAUTION</u>

<u>IF</u> recirculation flow has been reduced to one recirculation pump, the operator SHALL monitor recirculation flow <u>AND</u> start the idle pump, if the running pump is lost.

PLACE Safety Injection Recirc Switch 5 to ON 32.

Off-site power

| Nun | ibei | r:    |
|-----|------|-------|
| A   | OI   | 4.2.3 |

Title:

TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F

Revision:

REV. 5

| STEP | Α   | CTION/EXPECTED RESPONSE                    |     | RESP | ONSE NOT OBTAINED   |
|------|-----|--|-----|------|---|
|      | 33. | CHECK Service Water                        | 33. | PER  | FORM the following:   |
|      |     | non-essential header - TWO PUMPS OPERATING |     | a.   | Manually START one NESW pump in preferred order.  |
|      |     |  |     |      | • 22, 23, 21 pump <u>IF</u> non-essential header is 1-2-3   |
|      |     |  |     |      | • 25, 26, 24 pump <u>IF</u> non-essential header is 4-5-6   |
|      |     |  |     | b.   | IF ONLY one Service Water pump operating, PERFORM the following:                                  |
|      |     |  |     |      | IF both recirculation     pumps running, STOP     one recirculation pump                          |
|      |     |  |     |      | 2. CLOSE 804, Spent<br>Fuel Pit Heat<br>Exchanger Outlet Stop                                     |
|      | 34. | CHECK CCW - TWO PUMPS<br>OPERATING         | 34. | PER  | FORM the following:   |
|      |     | OFERAMING                                  |     | a.   | START 22, 21 <u>OR</u> 23 CCW<br>Pump (preferred order)   |
|      |     |  |     | b.   | IF ONLY one CCW pump operating AND two recirculation pumps operating, STOP one recirculation pump |
|      | 35. | VERIFY 22 Recirculation Pump - OPERATING   | 35. | STA  | RT 21 Recirculation Pump  |
|      |     |  |     |      |   |

| Number:   | Title:  | Revision: |
|-----------|---|-----------|
| AOI 4.2.3 | TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS<br>TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F | REV. 5    |

| STEP | Α   | CTION       | VEXPECTED RESPONSE                                  |     | RESPONSE NOT OBTAINED   |
|------|-----|-------------|---|-----|---|
|      | 36. | CLO:<br>RWS | SE SI Test Line Stops to                            |     |   |
|      |     | (a)         | PLACE interlock switches to OFF                     |     |   |
|      |     |             | • MOV-842   |     |   |
|      |     |             | • MOV-843   |     |   |
|      |     | (b)         | CLOSE SI Test Line Stops to RWST                    |     |   |
|      |     |             | • MOV-842   |     |   |
|      |     |             | • MOV-843   |     |   |
|      | 37. |             | CK adequate CCW system ormance                      |     |   |
|      |     | (a)         | CHECK CCW System temperature - LESS THAN            | (a) | CLOSE <u>ONE</u> RHR Heat Exchanger<br>Flow Control Valve                                       |
|      |     |             | 150 °F  |     | • HCV -638  |
|      |     |             |   |     | ● HCV-640   |
|      |     | (b)         | CHECK CCW System temperature - LESS THAN 130 °F     | (b) | ESTABLISH backup cooling to SI  AND RHR pumps per SOP 4.1.2, Component Cooling System Operation |
|      |     | (c)         | CHECK CCW System temperature - STABLE OR DECREASING | (c) | VERIFY maximum available service water flow through CCW heat exchangers                         |
|      |     |             |   |     |   |

| Number:   | Title:   | Revision: |
|-----------|--|-----------|
| AOI 4.2.3 | TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F | REV. 5    |

| STEP | A   | CTION | I/EXPECTED RESPONSE   |     | RESPONSE NOT OBTAINED   |
|------|-----|-------|---|-----|---|
|      | 38. | Gene  | CK <u>IF</u> intact Steam<br>erators (SGs) should be<br>essurized to RCS pressure                           |     |   |
|      |     | (a)   | CHECK RCS pressure -<br>LESS THAN INTACT SG<br>PRESSURE   | (a) | GO TO Step 39   |
|      |     | (b)   | CHECK SGs radiation - NORMAL  | (b) | Do <u>NOT</u> dump steam from any SG with high radiation  |
|      |     |       | <ul> <li>R-49, Steam</li> <li>Generator</li> <li>Blowdown Radiation</li> <li>Recorder</li> </ul>            |     |   |
|      |     |       | <ul> <li>R-28, R-29, R-30 or</li> <li>R-31, Main Steam</li> <li>Line Radiation</li> <li>Recorder</li> </ul> |     |   |
|      |     |       | <ul> <li>R-45, Air Ejector</li> <li>Radiogas Monitor</li> <li>Recorder</li> </ul>                           |     |   |
|      |     | (c)   | DUMP steam to condenser<br>from intact SGs <u>UNTIL</u> SG<br>pressure less than RCS<br>pressure            | (c) | DUMP steam using intact SGs atmospheric steam dumps <u>UNTIL</u> SG pressure less than RCS pressure |
|      | 39. |       | ERMINE <u>IF</u> Reactor Vessel<br>I should be vented   |     |   |
|      |     | (a)   | CONSULT Technical<br>Support Center   |     |   |

| Number:   | Title:   | Revision: |
|-----------|--|-----------|
| AOI 4.2.3 | TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F | REV. 5    |

| STEP | A   | CTION   | VEXPECTED RESPONSE  |     | RESPONSE NOT OBTAINED |
|------|-----|---|---|-----|-----------------------|
|      | 40. | CHE(  | CK <u>IF</u> EDGs should be<br>ped  |     |                       |
|      |     | (a)   | CHECK AC 480V buses -<br>ENERGIZED FROM<br>OFFSITE SOURCES                      |     |                       |
|      |     | (b)   | CHECK lighting - RESET  | (b) | RESET lighting        |
|      |     | (c)   | CHECK <u>ALL</u> MCCs<br><u>EXCEPT</u> MCC 28 <u>AND</u><br>MCC 28A - ENERGIZED | (c) | ENERGIZE MCCs         |
|      |     | (d)   | STOP any unloaded EDG   |     |                       |
|      |     |   | (1) PLACE EDG in standby  |     |                       |
|      | 41. | I. DIRECT Chemistry to OBTAIN the following samples |   |     |                       |
|      |     | •   | RCS boron concentration   |     |                       |
|      |     | •   | RCS activity  |     |                       |
| Te   |     | •   | Containment Atmosphere (H2/O2)  |     |                       |
|      |     | •   | Containment Sump boron concentration  |     |                       |
|      |     | •   | Activity of all Steam<br>Generators   |     |                       |
|      |     | •   | Recirculation Sump pH   |     |                       |
|      | 42. |   | AIN Recirculation Sump pH<br>ole results  |     |                       |
|      |     | samp  | oie results   |     |                       |

AOI 4.2.3 TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS
TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F

Revision:

REV. 5

| <u> </u> | <u> </u> |  |     |       |             |  |
|----------|----------|--|-----|-------|-------------|--|
| STEP     | Α        | CTION/EXPECTED RESPONSE  |     | RESP  | ONSE        | NOT OBTAINED   |
|          | 43.      | CHECK Recirculation Sump<br>water pH - BETWEEN 7.0 and<br>9.5  | 43. | PER   | FORM        | the following:   |
|          |          |  |     | a.    | CON         | l is less than 7.0,<br>SULT Technical Support<br>er (TSC) for methods of<br>g pH                     |
|          |          |  |     |       | 1.          | INCREASE<br>Recirculation Sump pH<br>as directed by TSC  |
|          |          |  |     |       | 2.          | GO TO Step 42 to<br>determine effect of pH<br>adjustment <u>AND</u><br>CONCURRENTLY<br>GO TO Step 44 |
|          |          |  |     | b.    | ADD<br>BAST | l is greater than 9.5,<br>boric acid from the<br>I to RCS through normal<br>Iternate charging path   |
|          |          |  |     |       | 1.          | GO TO Step 42 to<br>determine effect of pH<br>adjustment <u>AND</u><br>CONCURRENTLY<br>GO TO Step 44 |
|          | 44.      | CHECK Containment Hydrogen concentration - LESS THAN 3 PERCENT   | 44. | in se | rvice p     | st Accident Vent System<br>er SOP 10.9.2, Post<br>System Operation                                   |
| ,        | 45.      | CHECK Cold Leg recirculation in service - GREATER THAN 24 HOURS  | 45. | GO 1  | ΓO Ste      | p 37   |
|          |          | (a) GO TO AOI 4.2.4, Transfer to Hot Leg Recirculation During LOCA When RCS Temperature At Least 200°F And Less Than 350°F |     |       |             |  |
|          |          | END  |     |       |             |  |

| Number:   | Title:   | Revision: |
|-----------|--|-----------|
| AOI 4.2.3 | TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F | REV. 5    |

### 6.0 REFERENCES

### 6.1 **DEVELOPMENT DOCUMENTS**

EOP ES-1.3, Transfer to Cold Leg Recirculation

### 6.2 INTERFACING DOCUMENTS

### 6.2.1 PROCEDURES

AOI 4.2.5 Loss Of Emergency Coolant Recirculation During LOCA When RCS Temperature At Least 200°F And Less Than 350°F

SOP 4.1.2 Component Cooling System Operation

SOP 10.9.2 Post Accident Vent System Operation

AOI 4.2.4 Transfer to Hot Leg Recirculation During LOCA When RCS Temperature At Least 200°F And Less Than 350°F

### 6.2.2 TECHNICAL SPECIFICATIONS

None

### 6.3 **COMMITMENTS**

None 1

| Number:   | Title:   | Revision: |
|-----------|--|-----------|
| AOI 4.2.3 | TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F | REV. 5    |

| 6.4 | UFSAR       |  |
|-----|-------------|--|
|     | 1.3.5       | Reactivity Control                                     |
|     | 3.1.2.5     | Reactivity Shutdown Capability                         |
|     | 6.2.2.1.1   | Injection Phase  |
|     | 6.2.2.1.2   | Recirculation Phase                                    |
|     | 6.2.2.1.4   | Changeover From Injection Phase To Recirculation Phase |
|     | 6.2.2.3     | Components; reference to NaOH in paragraph 4           |
|     | 6.3         | Containment Spray System                               |
|     | 6.8.2.1     | Hydrogen Recombiners                                   |
|     | 6.8.2.2     | Containment Vent System                                |
|     | 6.8.3       | Post Accident Hydrogen Generation                      |
|     | Figure 6A-1 | Sump pH vs. Time After LOCA                            |
|     | 7.5.2.1.3   | Containment Hydrogen Concentration                     |
|     | 9.2.1.2     | Reactivity Hold-Down Capability                        |
|     | 9.2.2       | [System Design And Operation CVCS ]                    |
|     | 9.2.2.4.16  | Boric Acid Storage Tanks                               |
|     | 9.2.2.4.18  | Batching Tank  |
|     | 9.2.2.4.20  | Boric Acid Blender                                     |
|     | 14.3.2.2    | Description Of Small Break LOCA Transient              |
|     | 14.3.3.1.2  | Small Break LOCA Evaluation Model                      |
|     |             |  |

| Number:   | Title:   | Revision: |
|-----------|--|-----------|
| AOI 4.2.3 | TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F | REV. 5    |

STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED

ATTACHMENT 1

### **COLD LEG RECIRCULATION USING RHR PUMPS**

- 1. ESTABLISH RHR Cold Leg Recirculation
  - (a) PLACE Safety Injection Recirc Switch 3 to OFF
  - (b) ESTABLISH Recirculation flow (b) path

GO TO AOI 4.2.5, Loss Of Emergency Coolant Recirculation During LOCA When RCS Temperature At Least 200°F And Less Than 350°F

- (1) CHECK MOV-882 CLOSED
- (1) CLOSE MOV-882

- (2) OPEN MOV-744
- (3) OPEN MOV-1805
- (4) OPEN MOV-885A
- (5) **OPEN MOV-885B**
- (6) START ONE RHR Pump:
- (6) GO TO AOI 4.2.5, Loss Of Emergency Coolant Recirculation During LOCA When RCS Temperature At Least 200°F And Less Than 350°F
- 21 RHR Pump
- 22 RHR Pump
- (c) RETURN TO Step 13

**END OF ATTACHMENT 1** 

Number:

Title:

**AOI 4.2.3** 

# TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F

Revision:

REV. 5

# **ATTACHMENT 2**

### **480V BUS EQUIPMENT LOAD RATINGS**

| LOAD   | 21 EDG   | **************************************   | 22 EDG                     | · <del>·····</del>  | 23 EDG |
|--|--|--|----------------------------|---|--------|
|  | BUS 5A   | BUS 2A   |                            | BUS 3A  | BUS 6A |
| 21 Service water pump  | 277 KW   |  |                            |   |        |
| 22 Service water pump  |  | 277 KW   | <u>OR</u>                  | 277 KW  |        |
| 23 Service water pump  |  |  |                            |   | 277 KW |
| 24 Service water pump  | 277 KW   |  |                            |   |        |
| 25 Service water pump  |  | 277 KW   | <u>OR</u>                  | 277 KW  |        |
| 26 Service water pump  |  |  | و مداند و درود د د رود     |   | 277 KW |
| PRZR Control Heaters   |  |  | Desplaying Comments        |   | 277 KW |
| 21 PRZR BU Heaters   |  |  |                            | 554 KW  |        |
| 22 PRZR BU Heaters   |  | 485 KW   |                            |   | :      |
| 23 PRZR BU Heaters   | 485 KW   |  |                            |   | -      |
| Supplemental or company supplement of the supplemental supplement of the supplemental supplement | Elifornia de la companya della companya de la companya de la companya della companya della companya de la companya della compa | To see the second of the secon | . Takkeese                 | real in the way to the second of the second |        |
| 21 AFW Pump  |  |  |                            | 375 KW  |        |
| 22 AFW Pump  |  | an ekanika   |                            |   | 375 KW |
| 21 Fan Cooler Unit   | 250 KW   |  |                            |   |        |
| 22 Fan Cooler Unit   | 250 KW   |  |                            |   |        |
| 23 Fan Cooler Unit   |  | 250 KW   |                            |   |        |
| 24 Fan Cooler Unit   |  |  |                            | 250 KW  |        |
| 25 Fan Cooler Unit   | The state of the s | en i en  | ودورد                      |   | 250 KW |
| 21 SI Pump   | 327 KW   |  | Tall de Sanda de Carlos    | Rosemenski se osta  |        |
| 22 SI Pump   | 02, 1(1)   | 327 KW   | <u>OR</u>                  | 327 KW  |        |
| 23 Si Pump   |  | <b>J</b>   | <u>711</u>                 | <b>52</b> , 100   | 327 KW |
| Property of the Basic Carlos Community of the State of th | Haranda ya Mili Haranda Haranda Baranda<br>Manazar ya Marianda Marianda Baranda B  | Benedicting (State of the Control of | The entering of the second |   |        |
| 21 CS Pump   | 348 KW   |  |                            |   |        |
| 22 CS Pump   |  |  |                            |   | 348 KW |

Number:

Title:

**AOI 4.2.3** 

# TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F

Revision:

REV. 5

ATTACHMENT 2
480V BUS EQUIPMENT LOAD RATINGS (Continued)

| <u>LOAD</u>                               | 21 EDG                | 22  | EDG                             | 23 EDG     |
|---|-----------------------|---|---------------------------------|------------|
|   | BUS 5A                | BUS 2A  | BUS 3A                          | BUS 6A     |
| 21 RHR Pump                               |                       |   | 319 KW                          |            |
| 22 RHR Pump                               |                       |   |                                 | 319 KW     |
| 21 Charging Pump                          | 150 KW                | neter til stolladisk krise  |                                 |            |
| 22 Charging Pump                          |                       |   | 150 KW                          |            |
| 23 Charging Pump                          | ender State en de ser | e de la composition de la composition<br>Composition de la composition de la co | and pure same egyptimise in the | 150 KW     |
| 21 Recirc Pump                            | 304 KW                |   |                                 |            |
| 22 Recirc Pump                            |                       |   |                                 | 304 KW     |
| 21 CCW Pump                               | 228 KW                |   |                                 |            |
| 22 CCW Pump                               |                       | 228 KW  |                                 |            |
| 23 CCW Pump                               |                       |   |                                 | 228 KW     |
| 21 Lighting Xformer                       |                       | 150 KW (N)  | Misfuther of Principle          | 150 KW (E) |
| 22 Lighting Xformer                       |                       |   | 225 KW                          |            |
| 23 Lighting Xformer  Turbine Aux Oil Pump | <b>225 KW</b>         | undeks giffets that a# miner bisht, silve<br>- Park III udd III III   |                                 | 112 KW     |
| Station Air Compressor                    | 93 KW                 |   |                                 |            |

**END OF ATTACHMENT 2** 

REVISION PROCESS GSAD 13
Rev. 14

# ATTACHMENT 3 PROCEDURE CHANGE SUMMARY/TECHNICAL REVIEW

Procedure No. AOI 4.2.3 Rev 5

Title TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F

STEP DESCRIPTION OF CHANGE / REASON FOR CHANGE

<<Reason For Change>>

GENERAL - Made minor formatting corrections per GSAD 9 requirements.

Made the following formatting and typo corrections per CR 200109148:

Step 10.b.2 RNO - Corrected typo (Changed "FCV-1111" to "FCV-1112")

Step 18 RNO - Corrected indent of bulleted items

Step 13.b table - Centered table

The above are administrative changes per SAO-100. A 50.59 screen is not required.

### ATTACHMENT 1 REVISION CHECKLIST

| PROCEDURE NUMBER                              | AOI 4.2.3  |                                   | . Kev   | 5                |          |
|---|--|-----------------------------------|---------|------------------|----------|
| ANALYST                                       | Addre Revision Type, Circle One:  LIMITED SCOPE  BIENNIA  PCs incorporated into this revision *  Cancellation forms completed for each TPC (List TPCs incorporated)  ermanent TPCs re-issued or canceled.  communications to Staff incorporated.* (List CTSs incorporated)  perator Aids OR Corrective Actions incorporated.  20010  acing Document Reference List checked/updated.  R section of the procedure checked/updated dure Commitments section checked/updated (i.e. go to step x, per SOP X.X)  lant Modifications incorporated AND procedure nomenclature agrees with fierument is added to OR deleted from a log, I&C OR T&P notified | 7/10/03                           |         |                  |          |
| Procedure Revision Type,                      | Circle One:  | LIMITED SCOPE                     | ВІ      | ENNIAL*†         |          |
|   |  |                                   |         | <u> Y/N</u>      | 1        |
| ALL TPCs incorporated in                      | to this revision *   |                                   |         | N/A              | ł        |
| TPC Cancellation forms c                      | ompleted for eac   | th TPC (List TPCs incorpora       | ited)   | N/A              | <u>\</u> |
| Non-permanent TPCs re-i                       | ssued or cancel  | ed                                |         | N/A              | <b>-</b> |
| ALL Communications to S                       | staff incorporated   | l.* (List CTSs incorporated)      |         | N/A              | _        |
| List Operator Aids OR Co                      | rrective Actions i   | ncorporated.                      |         |                  | _        |
|   |  |                                   |         | 200109148        | _        |
| Interfacing Document Ref                      | erence List chec   | ked/updated.                      |         | <u>Y</u>         | _        |
| UFSAR section of the pro-                     | cedure checked/  | updated                           |         | <u>Y</u>         | _        |
| Procedure Commitments                         | section checked/   | updated <u>AND</u> associated st  | eps ma  | arked * N/A      | <u>\</u> |
| Cross-references in proce                     | dure checked/up  | odated (i.e. go to step x, per    | SOP X   | (.X) <u>Y</u>    |          |
| <b>ALL</b> Plant Modifications in             | corporated AND   | procedure nomenclature ag         | jrees v | vith field * N/A | <u>\</u> |
| IF instrument is added to (COMMITMENT: 5.2.1) | OR deleted from  | a log, I&C <u>OR</u> T&P notified |         | N/A              | <u>\</u> |
| ALL review recommendati                       | ions resolved *  |                                   |         |                  |          |
| PROCEDURE COORDIN                             | ATOR   |                                   |         |                  |          |
| Incorporated items checke                     | ed as Approved i   | n Generation Support Datab        | ase     |                  | _        |
| Procedure meets requiren                      | nents for Biennia  | l review per GSAD 10 <sup>†</sup> |         |                  | _        |
| SAO 404 and 460 Checkli                       | ists complete as   | applicable                        |         |                  | ***      |
| PROCEDURE ADMINIST                            | RATOR  |                                   |         |                  |          |
| Procedure No. Title, and f                    | Rev No. Entered/   | Updated in Generation Sup         | port Da | atabase          | _        |
|   |  |                                   |         |                  |          |

<sup>\* &</sup>lt;u>ALL</u> items for each of the questions with \*'s must be incorporated <u>AND</u> <sup>†</sup>GSAD 10 requirements met for the revision to be credited as a biennial review.

# FIGURE 2 TPC CLEARANCE AUTHORIZATION FORM

| PART I                  | <u>AUTHORIZATION</u>  | <u>l</u>                    |
|-------------------------|---|-----------------------------|
| TPC #                   |   | Procedure AOI 4.2.3         |
| Procedure 1<br>TEMPERAT | Title_TRANSFER TO COLD LEG RECIRCUITURE AT LEAST 200 °F AND LESS THAN 3                       | _ATION DURING LOCA WHEN RCS |
| TPC Descri              | ption   |                             |
| Reason fo               | or Clearance: Check applicable box.   |                             |
| Other                   | New Procedure Revision Issued   | (OM authorization required) |
| Clearance A             | Authorized (OM / AOM / GSM)   | Date//                      |
| PART II                 | CLEARANCE   |                             |
| CCR                     | TPC Log Index Closed Out TPC Log Copy Removed CCR Controlled Copy                             |                             |
| <u>Field</u>            | Nuclear NPO Office  |                             |
| Operations              | Staff Office  |                             |
|                         | Staff Controlled Copy TPC Log Index Closed Out Revision Control Book Operations Manager Books |                             |
| <u>Administrati</u>     | ve Copies   |                             |
|                         | TSC Training Records Management Center  |                             |
| Additional C            | Controlled Copies   |                             |
|                         |   |                             |

#### ATTACHMENT I Page 1 of 1

### **SNSC ITEM SUMMARY SHEET**

| To: SNSC         | Secretary                                    | Date:                                  |                          |                 |
|------------------|--|--|--------------------------|-----------------|
| From:            | Mark Miller                                  |  |                          |                 |
| •                | (Presenter's Name                            | e and Title)                           | (Extension)              |                 |
| Subject:         | SNSC Agenda Request for SNSC                 | C on:                                  |                          |                 |
| •                | -  |  | (Date)                   |                 |
| Department:      | Generation Support                           | Section:                               |                          |                 |
| Document No:     | AOI 4.2.3                                    | Revision:                              | 5                        |                 |
| Document Title:  | TRANSFER TO COLD LEG<br>RCS TEMPERATURE AT L | RECIRCULATION DU<br>EAST 200 °F AND LE | JRING LOCA<br>SS THAN 35 | A WHEN<br>60 °F |
| Brief Summary    | (description of subject, reason for          | changes, etc.):                        |                          |                 |
| See Reason For   | Change Summary                               |  |                          |                 |
|                  | <b>,</b>                                     |  |                          |                 |
|                  |  |  |                          |                 |
|                  |  |  |                          |                 |
|                  |  |  |                          |                 |
|                  |  |  |                          |                 |
| List Contents of | SNSC Package:                                |  |                          |                 |
|                  |  |  |                          |                 |
|                  |  |  |                          |                 |
| Applicable Refe  | rence Documents:                             |  |                          |                 |
| ••               |  |  |                          |                 |
|                  |  |  |                          |                 |
| Supervisor's     |  | ·                                      |                          |                 |
| Name and         |  |  | Date:                    |                 |
| Signature:       |  |  |                          |                 |

Submit Attachment I (as a cover sheet) and the review document\* to the SNSC Secretary no less

than 3 working days prior to the targeted SNSC meeting (Section 4.8.1). If less than 3 working days, the activity will be treated as a "walk-in" (Section 4.7.3).

\* The document should be organized as follows: SAO-460 review package, affected pages of change (if applicable), LAR, TS, or TS Bases changes (entire package), and any other relevant items that would support the review.

# ATTACHMENT III Page 1 of 1

# **SNSC REVIEW COVER SHEET**

| Title: TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F  SNSC has reviewed this item and has determined that it (check as appropriate):  SNSC has reviewed this item and has determined that it (check as appropriate):  Does Does not Require a License Amendment Does Does not Adversely impact plant nuclear safety Does Does not Adversely impact the health and safety of plant personnel or the public  | Originatii<br>No.: | ng Document     | AOI 4.2.3                               |                    |                  | ,              | Revision No.: | 5 |
|---|--------------------|-----------------|---|--------------------|------------------|----------------|---------------|---|
| SNSC has reviewed this item and has determined that it (check as appropriate):  SNSC has reviewed this item and has determined that it (check as appropriate):  Does Does not Require a License Amendment Does Does not Adversely impact plant nuclear safety Does Does not Adversely impact the health and safety of plant personnel or the public Does Does not Require further review by the Plant Manager, NFSC, or other individual/group:  Plant Manager NFSC Other (specify) Remarks:  SNSC recommends this item for:  Approval Disapproval Other Other Completed by: Date Meeting No Completed by: Date Meeting No Completed specific properties as appropriate): | Title: TR          | ANSFER TO C     | OLD LEG RECIRCUI                        | ATION              | DURING LO        | CA WHEN RCS    | · ·           |   |
| SNSC has reviewed this item and has determined that it (check as appropriate):  Does Does not Require a License Amendment Does Does not Adversely impact plant nuclear safety Does Does not Adversely impact the health and safety of plant personnel or the public Does Does not Require further review by the Plant Manager, NFSC, or other individual/group:  Plant Manager NFSC Other (specify)  Remarks:  SNSC recommends this item for: Approval Disapproval Other  Completed by: Date Meeting No   | TE                 | MPERATURE       | AT LEAST 200 °F AN                      | VD LES             | S THAN 350 Y     | <u> </u>       |               |   |
| SNSC has reviewed this item and has determined that it (check as appropriate):  Does Does not Require a License Amendment Does Does not Adversely impact plant nuclear safety Does Does not Adversely impact the health and safety of plant personnel or the public Does Does not Require further review by the Plant Manager, NFSC, or other individual/group:  Plant Manager NFSC Other (specify)  Remarks:  SNSC recommends this item for: Approval Disapproval Other  Completed by: Date Meeting No   |                    |                 |   |                    |                  |                |               |   |
| SNSC has reviewed this item and has determined that it (check as appropriate):  Does Does not Require a License Amendment Does Does not Adversely impact plant nuclear safety Does Does not Adversely impact the health and safety of plant personnel or the public Does Does not Require further review by the Plant Manager, NFSC, or other individual/group:  Plant Manager NFSC Other (specify)  Remarks:  SNSC recommends this item for: Approval Disapproval Other  Completed by: Date Meeting No   |                    |                 |   |                    |                  |                |               |   |
| SNSC has reviewed this item and has determined that it (check as appropriate):  Does Does not Require a License Amendment Does Does not Adversely impact plant nuclear safety Does Does not Adversely impact the health and safety of plant personnel or the public Does Does not Require further review by the Plant Manager, NFSC, or other individual/group:  Plant Manager NFSC Other (specify)  Remarks:  SNSC recommends this item for: Approval Disapproval Other  Completed by: Date Meeting No   |                    |                 |   |                    |                  |                |               |   |
| SNSC has reviewed this item and has determined that it (check as appropriate):  Does Does not Require a License Amendment Does Does not Adversely impact plant nuclear safety Does Does not Adversely impact the health and safety of plant personnel or the public Does Does not Require further review by the Plant Manager, NFSC, or other individual/group:  Plant Manager NFSC Other (specify)  Remarks:  SNSC recommends this item for: Approval Disapproval Other  Completed by: Date Meeting No   | OMOG L.            |                 | • | 1 41 4 !           |                  | • `            |               |   |
| Does  | SNSC na            | s reviewed this | item and has determine                  | ed that 1          | t (check as appi | ropriate):     |               |   |
| Does Does not Adversely impact plant nuclear safety  Does Does not Adversely impact the health and safety of plant personnel or the public  Does Does not Require further review by the Plant Manager, NFSC, or other individual/group:  Plant Manager NFSC Other (specify)  Remarks:  SNSC recommends this item for:  Approval Disapproval Other  Completed by: Date Meeting No.   | SNSC ha            | s reviewed this | item and has determine                  | ed that i          | t (check as appr | opriate):      |               | · |
| Does Does not Adversely impact plant nuclear safety  Does Does not Adversely impact the health and safety of plant personnel or the public  Does Does not Require further review by the Plant Manager, NFSC, or other individual/group:  Plant Manager NFSC Other (specify)  Remarks:  SNSC recommends this item for:  Approval Disapproval Other  Completed by: Date Meeting No.   | Does               | Does not        | Require a Li                            | cense A            | mendment         |                |               |   |
| Does Does not   | Does               |                 |   |                    |                  | tv             |               |   |
| individual/group: Plant Manager NFSC Other (specify)  Remarks:  SNSC recommends this item for: Approval Disapproval Other  Completed by: Date Meeting No  | Does               | <del></del>     | Adversely in                            |                    |                  |                | nnel or the   | ; |
| SNSC recommends this item for: Approval Disapproval Other  Completed by: Date Meeting No  | Does               | Does not        | Require furt                            | her revie<br>roup: | ew by the Plant  | Manager, NFSC, | or other      |   |
| SNSC recommends this item for:         Approval Disapproval Other         Completed by: Date Meeting No   |                    | _               | Plant Manager                           | r                  | NFSCOti          | her (specify)  |               |   |
| SNSC recommends this item for:         Approval Disapproval Other         Completed by: Date Meeting No   | Demarks            | ı               |   |                    |                  |                |               |   |
| Approval         Disapproval         Other           Completed by:         Date         Meeting No.   | Keniars.           |                 |   |                    |                  |                |               |   |
| Approval         Disapproval         Other           Completed by:         Date         Meeting No.   |                    |                 |   |                    |                  |                |               |   |
| Approval         Disapproval         Other           Completed by:         Date         Meeting No.   |                    |                 |   |                    |                  |                |               |   |
| Approval         Disapproval         Other           Completed by:         Date         Meeting No.   |                    |                 |   |                    |                  |                |               |   |
| Approval         Disapproval         Other           Completed by:         Date         Meeting No.   |                    |                 |   |                    |                  |                |               |   |
| Approval         Disapproval         Other           Completed by:         Date         Meeting No.   |                    |                 |   |                    |                  |                |               |   |
| Approval         Disapproval         Other           Completed by:         Date         Meeting No.   |                    |                 |   |                    |                  |                |               |   |
| Completed by: Date Meeting No   |                    | · -             |   |                    |                  | 0.1            |               |   |
|   | Approvai<br>       |                 | Disapprovai                             |                    |                  | Other          |               |   |
|   | Complete           | d by            |   | Doto               |                  | Maeting No     |               | - |
|   | Complete           |                 | NSC Secretary                           | _ Date             |                  | _ Meeting No   |               |   |

# TRANSFER TO COLD LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 $^{\circ}\text{F}$ AND LESS THAN 350 $^{\circ}\text{F}$

|                 | opy. Valid for 2 |                |                 |   |
|-----------------|------------------|----------------|-----------------|---|
| Reviewer / Date |                  |                | Reviewer / Date | - |
|                 |                  | BIENNIAL REVIE | ≣ <b>w</b>      | _ |
|                 |                  |                |                 |   |
|                 |                  |                | Effective Date  | - |
|                 | Signature        |                | Date            |   |
| Approval:       |                  |                |                 | _ |
|                 | Meeting No. /    | Date           |                 |   |
| SNSC Review:    |                  | Revi           | ewer:           | _ |
| Reviewer:       |                  | Revi           | ewer:           | - |
| Reviewer:       |                  | Revi           | ewer:           | _ |
| Prepared by:    | T.G. Harvey      | Revi           | ewer:           |   |

**CONTINUOUS USE** 

CREW "B"

20011128814

AOI 04-02-03 Rev 5.wpd

From:

**James Clifford** 

To:

Marsh, Tad

Date:

7/10/03 2:12PM

Subject:

Re: Extension for green ticket G20030384

We are requesting a 30 day extension for green ticket G20030384, which would change the EDO due date from 7/21/03 to 8/22/03. This GT is a letter sent to Chairman Diaz from Debbie Grinnell of the C-10 Research and Education Foundation, Newburyport, MA. Ms. Grinnell's concerns relate to the adequacy of SG tube inspections based on NRC Information Notice 2002-21 and J. Hopenfeld's "Differing Professionial Opinion" on the same subject. She is asking very detailed questions about SG tube inspections at Seabrook, requesting that the NRC order the industry to conduct adequate SG inspections, and requesting that the NRC issue a proposed rule to assure SG tube integrity.

Because of the extensive coordination necessary to address potential 2.206 implications, request for rulemaking, and to ensure we provide a response consistent with previous correspondence related to J. Hopenfeld's concerns, we request the EDO due date be extended to 8/22/03.

CC:

Boska, John; Holden, Cornelius; Nerses, Victor

# TRANSFER TO HOT LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F

AOI 4.2.4 REV. 5

# **TABLE OF CONTENTS**

| STEP NO                        | DESCRIPTION             | PAGE NO |
|--------------------------------|-------------------------|---------|
| 1.0 PURPOSE                    |                         | 1       |
| 2.0SYMPTOMS/ENTRY CONDITIONS   | 5                       | 1       |
| 3.0 AUTOMATIC ACTIONS          |                         | 1       |
| 4.0 IMMEDIATE OPERATOR ACTIONS | s                       | 1       |
| 5.00PERATOR ACTIONS            |                         | 2       |
| 6.0REFERENCES                  |                         | 10      |
| ATTACHMENT 1 COLD LEG RECIRC   | ULATION USING RHR PUMPS | 11      |
| ATTACHMENT 2 HIGH-HEAD SI PUM  | IP ISOLATION            | 12      |
| ATTACHMENT 3 ISOLATIONS FOR L  | ONG TERM RECIRCULATION  | 13      |

| Number:   | Title:  | Revision: |
|-----------|---|-----------|
| Tauriber. | ino.  | Hevision. |
| AOI 4.2.4 | TRANSFER TO HOT LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F | REV. 5    |

### 1.0 PURPOSE

1.1. This procedure provides instruction to the operator during the abnormal operating condition in which transfer to hot leg recirculation is required during a Loss Of Coolant Accident (LOCA), <u>WHEN</u> Reactor Coolant System (RCS) temperature is greater than <u>OR</u> equal to 200°F, <u>AND</u> less than 350°F.

### 2.0 SYMPTOMS/ENTRY CONDITIONS

2.1. Cold leg recirculation has been in progress for 24 hours.

### 3.0 AUTOMATIC ACTIONS

3.1. None

### 4.0 IMMEDIATE OPERATOR ACTIONS

4.1. None

Number: AOI 4.2.4 Title:

TRANSFER TO HOT LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F

Revision:

REV. 5

STEP

**ACTION/EXPECTED RESPONSE** 

RESPONSE NOT OBTAINED

### 5.0 OPERATOR ACTIONS

### CAUTION

Since water will be brought out of the Containment on Hot Leg recirculation, the potential for high radiation fields exists.

### NOTE

Adverse Containment conditions are in effect <u>IF</u> the Containment radiation levels ever exceed 1E5 R/hr <u>OR</u> the Containment pressure remains above 4 psig.

- 1. CHECK RHR Heat Exchanger Outlet Stops CLOSED
  - (a) MOV-889A

(a) CLOSE MOV-889A

(b) MOV-889B

- (b) CLOSE MOV-889B
- 2. CLOSE ONE Loop Cold Leg SI Stop
  - MOV- 856A, 21 Loop Cold Leg SI
  - MOV-856E, 23 Loop Cold Leg SI
- 3. OPEN MOV-856B, 23 Loop Hot Leg SI Stop
- 4. CLOSE ONE Loop Cold Leg SI Stop
  - MOV- 856C, 24 Loop Cold Leg SI
  - MOV-856D, 22 Loop Cold Leg SI
- 5. OPEN MOV-856F, 21 Loop Hot Leg SI Stop

Number: Title:

AOI 4.2.4 TRANSFER TO HOT LEG RECIRCULATION DURING LOCA WHEN RCS
TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F

Revision:
REV. 5

| STEP   | A   | CTION/EXPECTED RESPONSE  | RESPONSE NOT OBTAINED  |  |
|--|---|--|--|--|
|  |   |  |  |  |
| 6.   | . CHECK 22 SI pump alignment                          |  |  |  |
|  | (a)   | CHECK Safety Injection Recirc<br>Switch 1 - OFF                            | (a) PLACE Safety Injection Recirc<br>Switch 1 in OFF   |  |
|  | (b)   | CHECK MOV-887A - OPEN  | (b) OPEN MOV-887A  |  |
|  | (c)   | CHECK MOV-887B - OPEN  | (c) OPEN MOV-887A  |  |
| 7. CHECK valve alignment <u>AND</u> prepare to start SI pump |   |  |  |  |
|  | (a)   | CHECK RHR Heat Exchanger<br>Outlet to SI Pump Suction Stops -<br>OPEN      | (a) OPEN MOV-888A <u>AND</u> MOV-888B  |  |
|  |   | • MOV-888A   |  |  |
|  |   | • MOV-888B   |  |  |
|  | (b)   | PLACE High Head Low Suction<br>Pressure Alarm Switch to ON<br>(Panel SB-1) |  |  |
|  | (c)   | CHECK Safety Injection Recirc<br>Switch 7 - OFF                            | (c) PLACE Safety Injection Recirc<br>Switch 7 to OFF   |  |
| 8.   | CHECK SI pump suction pressure - GREATER THAN 75 PSIG |  | 8. CHECK SI valve alignment  |  |
|  | GRE   | AIEN INAN 75 PSIG  | <ul> <li>a. <u>IF</u> adequate suction pressure can <u>NOT</u> be established, CONSULT Operations Manager prior to continuing</li> </ul> |  |
| 9.   | START SI pumps as necessary                           |  |  |  |
|  | •   | 21 SI Pump<br>22 SI Pump<br>23 SI Pump                                     |  |  |
| 10.  | VER   | IFY adequate recirculation flow  |  |  |
|  | (a)   | Core Exit TCs - STABLE OR<br>DECREASING                                    | (a) GO TO Step 1   |  |

Number: Revision: TRANSFER TO HOT LEG RECIRCULATION DURING LOCA WHEN RCS **AOI 4.2.4** REV. 5 TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED 11. CHECK for Cold Leg recirc 11. GO TO Step 24 conditions CHECK Hot Leg Recirc has been (a) established - GREATER THAN 24 HOURS (b) CHECK RCS subcooling based on core exit TCs - GREATER THAN 52 °F (83 °F Adverse Containment) 12. CHECK Recirculation System Alignment VERIFY the following valves (a) PERFORM the following: (a) OPEN: IF neither valve can be a. 822A, 22 RHR Heat opened, GO TO Step 24 **Exchanger CCW Outlet** IF 822B is open, VERIFY Stop b. MOV-747 AND HCV-638 **OPEN** 822B, 21 RHR Heat **Exchanger CCW Outlet** Stop GO TO Step 13 1. IF 822A is open, VERIFY C. **MOV-746 AND HCV-640 OPEN** 1. GO TO Step 13 (b) VERIFY the following valves OPEN VERIFY the following valves (b) OPEN: MOV-747, 21 RHR

MOV-746, 22 RHR Heat Exchanger Outlet Stop

HCV-640, 22 RHR Heat

**Exchanger Flow Control** 

Valve

Heat Exchanger Outlet

HCV-638, 21 RHR Heat

**Exchanger Flow Control** 

Stop

Valve

| Numbe | 7:    |
|-------|-------|
| AOI   | 4.2.4 |

TRANSFER TO HOT LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F

Revision:

REV. 5

| 1 |      |                          |                       |
|---|------|--------------------------|-----------------------|
| I | STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|   |      |                          |                       |

### 13. CHECK IF low-head cold leg recirculation has been established

**DETERMINE** required core (a) cooling flow from table below

| No. of 946A-D Flow<br>Indicators Greater<br>Than 400 gpm | Core Flow Rate<br>on Indicators Greater<br>Than 400 gpm   |
|--|---|
| 4  | Lowest of these indicators - GREATER THAN 630 GPM OR Sum of two lowest of these indicators - GREATER THAN 950 GPM |
| 3  | Lowest of these indicators - GREATER THAN 630 GPM OR Sum of two lowest of these indicators - GREATER THAN 950 GPM |
| 2  | EACH GREATER THAN 500 GPM   |
| 1 <u>OR</u> None   | Required Core Cooling - NOT MET   |

- (b) **ESTABLISHED**
- Core flow rate required by table (b) ESTABLISH high-head cold leg recirculation, GO TO Step 27

| Number: |       |
|---------|-------|
| AOI 4   | 1.2.4 |

Title:

TRANSFER TO HOT LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F

Revision:

REV. 5

| STEP | A  | ACTION/EXPECTED RESPONSE                                    |        | RESF          | PONSE NOT OBTAINED   |  |
|------|--|---|--------|---------------|--|--|
|      |  |   |        |               |  |  |
| 14.  | 14. PLACE Safety Injection Recirc Switch 7 to ON |   |        |               |  |  |
|      | (a)  | CHECK <u>ALL</u> SI Pumps -<br>TRIPPED                      | (a) TR | RIP <u>AL</u> | <u>L</u> SI Pumps  |  |
|      | (b)  | CHECK MOV-887A - CLOSED                                     | (b) CL | .OSE          | MOV-887A   |  |
|      | (c)  | CHECK MOV-887B - CLOSED                                     | (c) CL | .OSE          | MOV-887B   |  |
| 15.  |  | CE Safety Injection Recirc<br>ch 8 to ON                    |        |               |  |  |
|      | (a)  | CHECK MOV-1810 - CLOSED                                     | (a) CL | .OSE          | MOV-1810   |  |
| 16.  |  | CK <u>ALL</u> 480V AC buses powered ONE of the following:   | 16.    | GO            | TO Step 20   |  |
|      | •  | <b>Emergency Diesel Generators</b>                          |        |               |  |  |
|      | •  | Off-site power  |        |               |  |  |
| 17.  |  | CE Safety Injection Recirc<br>ch 5 to ON                    |        |               |  |  |
| 18.  |  | CK Service Water non-essential<br>der - TWO PUMPS OPERATING | 18.    | PEF           | RFORM the following:   |  |
|      | Neac   | ler • I WU PUWIFS UPENATING                                 | a.     |               | on-essential header is 1-2-3,<br>.RT 23 <u>OR</u> 21 SW pump                                     |  |
|      |  |   | b.     |               | on-essential header is 4-5-6,<br>IRT 26 <u>OR</u> 24 SW pump                                     |  |
|      |  |   | C.     | oper<br>pum   | PNLY one Service Water pump rating <u>AND</u> two recirculation ups operating, PERFORM the wing: |  |
|      |  |   |        | 1.            | STOP 21 Recirculation Pump   |  |
|      |  |   |        | 2.            | CLOSE 804, Spent Fuel Pit<br>Heat Exchanger Outlet Stop  |  |

| Numbe | r:    |
|-------|-------|
| AOI   | 4.2.4 |

Title:

TRANSFER TO HOT LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F

Revision:

Attachment 1, Cold Leg Recirculation Using RHR Pumps

REV. 5

| OTED | ACTION/EVECTED DECEMENT                  |     | DECENAL POT OPTAINED |  |  |  |
|------|--|-----|----------------------|--|--|--|
| STEP | ACTION/EXPECTED RESPONSE                 |     | HESP                 | ONSE NOT OBTAINED  |  |  |
| 19.  | CHECK CCW - TWO PUMPS                    | 19. | PER                  | FORM the following:  |  |  |
|      | OPERATING                                |     | (a)                  | START 21 OR 23 CCW Pump  |  |  |
|      |  |     | (b)                  | IF ONLY one CCW Pump operating AND two recirculation pumps operating, STOP 21 Recirculation Pump |  |  |
| 20.  | VERIFY 22 Recirculation Pump - OPERATING | 20. | PER                  | FORM the following:  |  |  |
|      |  |     | (a)                  | START 21 Recirculation<br>Pump   |  |  |
|      |  |     | (b)                  | IF neither Recirculation Pump can be started, PERFORM  |  |  |

- 21. CLOSE RHR Minimum Flow Test Line Stops (98 ft PAB)
  - MOV-743
  - MOV-1870
- 22. CLOSE SI Test Line Stops to RWST
  - (a) PLACE interlock switches to OFF
    - MOV-842
    - MOV-843
  - (b) CLOSE SI Test Line Stops to RWST
    - MOV-842
    - MOV-843
- 23. ISOLATE SI pumps per Attachment 2, High-Head SI Pump Isolation

**AOI 4.2.4** 

(e)

Title

TRANSFER TO HOT LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F

Revision:

REV. 5

| STEP | ACTION/EXPECTED RESPONSE |  | RESPONSE NOT OBTAINED   |
|------|--------------------------|--|---|
|      |                          |  |   |
| 24.  | ALIG                     | aN Seal Gas System   |   |
|      | (a)                      | CHECK 1442, PCV-1090 N₂<br>Pressure Regulator Inlet Stop -<br>CLOSED   | (a) CLOSE 1442  |
|      | (b)                      | CHECK 1444, PCV-1090, N₂<br>Pressure Regulator BYPASS<br>Stop - CLOSED | (b) CLOSE 1444  |
|      | (c)                      | CHECK N₂ Header Pressure -<br>GREATER THAN 250 PSIG<br>(PI-1075)       | (c) RESTORE N <sub>2</sub> Header Pressure per SOP 10.4.1, Isolation Valve Seal Water System Operations |
|      | (d)                      | OPEN 1442, PCV-1090 N₂<br>Pressure Regulator Inlet Stop                |   |

ADJUST PCV-1090 to maintain

250 psig (PI-1089)

Title:

TRANSFER TO HOT LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F

Revision:

REV. 5

STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED

### 25. CLOSE Containment manual isolation valves

- (a) CONSULT SM to determine necessary valves on Attachment 3, Isolations For Long Term Recirculation, to be closed
- (b) DIRECT NPO to close the necessary valves with Health Physics assistance
- 26. CHECK Hot Leg Recirculation TERMINATED
- 26. GO TO Step 11

- (a) GO TO Step 31
- 27. CLOSE MOV-856B, 23 Loop Hot Leg SI Stop
- 28. OPEN ONE of the following:
  - MOV-856A, 21 Loop Cold Leg SI Stop
  - MOV-856E, 23 Loop Cold Leg SI Stop
- 29. CLOSE MOV-856F, 21 Loop Hot Leg SI Stop
- 30. OPEN ONE of the following:
  - MOV-856C, 24 Loop Cold Leg SI Stop
  - MOV-856D, 22 Loop Cold Leg SI Stop
- 31. EVALUATE long term plant status
  - (a) CONSULT Technical Support Center

**END** 

Number: AOI 4.2.4 Title:

TRANSFER TO HOT LEG RECIRCULATION DURING LOCA WHEN RCS
TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F

Revision:

REV. 5

### 6.0 REFERENCES

### 6.1 DEVELOPMENT DOCUMENTS

- ES-1.4 Transfer to Hot Leg Recirculation
- AOI 4.2.3 Transfer to Cold Leg Recirculation During LOCA When RCS Temperature At Least 200 °F and Less Than 350 °F

### **6.2 INTERFACING DOCUMENTS**

#### 6.2.1 PROCEDURES

- AOI 4.2.5 Loss of Emergency Coolant Recirculation During LOCA When RCS Temperature At Least 200 °F and Less Than 350 °F
- SOP 10.4.1 Isolation Valve Seal Water System Operations

### 6.2.2 TECHNICAL SPECIFICATIONS

None

### 6.3 **COMMITMENTS**

None

#### 6.4 UFSAR

None

Number: AOI 4.2.4

Title:

TRANSFER TO HOT LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F

Revision:

REV. 5

STEP ACTION/EXPECTED RESPONSE

**RESPONSE NOT OBTAINED** 

### **ATTACHMENT 1**

### **COLD LEG RECIRCULATION USING RHR PUMPS**

- 1. ESTABLISH RHR Cold Leg Recirculation
  - (a) PLACE Safety Injection Recirc Switch 3 to OFF
  - (b) ESTABLISH Recirculation flow path
- (b) GO TO AOI 4.2.5, Loss of Emergency Coolant Recirculation During LOCA When RCS Temperature At Least 200 °F and Less Than 350 °F
- (1) CHECK MOV-882 CLOSED
- (1) CLOSE MOV-882

- (2) OPEN MOV-744
- (3) OPEN MOV-1805
- (4) OPEN MOV-885A
- (5) OPEN MOV-885B
- (6) START ONE RHR Pump
- (6) GO TO AOI 4.2.5, Loss of Emergency Coolant Recirculation During LOCA When RCS Temperature At Least 200 °F and Less Than 350 °F
- 21 RHR Pump

OR

- 22 RHR Pump
- (c) RETURN TO Step 21

**END OF ATTACHMENT 1** 

Title

**AOI 4.2.4** 

TRANSFER TO HOT LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F

Revision:

REV. 5

# ATTACHMENT 2 HIGH-HEAD SI PUMP ISOLATION

|                                      | Valve Operation   | Locat                        | ion           | Valving ① Completed |
|--------------------------------------|---|------------------------------|---------------|---------------------|
| <u>IF</u> on low-head recirculation, | ISOLATE SI Pumps:   |                              |               |                     |
| Í                                    | 1) CLOSE MOV-1810   | CCR                          | (2)           |                     |
|                                      | 2) CLOSE MOV-850A   | 1                            | (2)           | <del></del>         |
|                                      | 3) CLOSE MOV-850B   | 1                            | (2)           |                     |
|                                      | 4) CLOSE MOV-851A   | CCR                          | (2)           |                     |
|                                      | 5) CLOSE MOV-851B   | CCR                          | (2)           | <del></del>         |
| İ                                    | 6) CLOSE MOV-888A   | CCR                          | (3)           |                     |
|                                      | 7) CLOSE MOV-888B   | CCR                          | (3)           |                     |
|                                      | 8) OPEN SOV-3502  |                              | ` '           |                     |
|                                      | (IVSW to MOV-850B)  | 4                            | (2)           |                     |
|                                      | 9) ÒPEN SOV-3503  |                              | ` '           |                     |
|                                      | (IVSSW to MOV-851B)   | 4                            | (2)           |                     |
|                                      | 10) OPEN SOV-3512   |                              | ` '           |                     |
|                                      | (IVSW to MOV-851A)  | 4                            | (2)           |                     |
|                                      | 11) OPEN SOV-3513   |                              | •             |                     |
|                                      | (IVSW to MOV-850A)  | 4                            | (2)           |                     |
|                                      | 12) OPEN SOV-3507   |                              |               |                     |
|                                      | (N <sub>2</sub> Gas to MOV-888A)  | 4                            | (2)           |                     |
|                                      | 13) OPEN SOV-3508   |                              |               |                     |
|                                      | (N <sub>2</sub> Gas to MOV-888B)  | 4                            | (2)           | ***                 |
| Location:                            | 1 MCC 26AA AND MCC 26BB PAE<br>2 SI Pump Room PAB 59 ft. EL (Lo<br>3 Piping Penetration Area PAB 51 ft<br>4 IVSW Control Panel PAB 98 ft. E<br>5 Piping Penetration Area Mezzania<br>6 PAB 15 ft. EL (Local)                    | cal)<br>t. EL (Lo<br>L (Remo | ocal)<br>ote) | ·                   |
| stop. The C                          | The NPO should initial each valving completed space as he properly positions each stop. The Control Room Supervisor (CRS) can remotely position some MOVs; <u>IF</u> he does so, he should initial the valving completed space. |                              |               |                     |

### **END OF ATTACHMENT 2**

Title:

**AOI 4.2.4** 

### TRANSFER TO HOT LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F

Revision:

REV. 5

# ATTACHMENT 3 ISOLATIONS FOR LONG TERM RECIRCULATION

| Permission @<br>Granted   | Valve Operation  | Location                | Valving ① Completed                   |
|---|--|-------------------------|---------------------------------------|
| ·   | ISOLATE charging line:   |                         |                                       |
|   | <ol> <li>CLOSE MOV-205</li> <li>CLOSE MOV-226</li> <li>CLOSE Mov-227</li> <li>OPEN SOV-3501 (IVSW between MOV-226</li> </ol>   | 1 (3)<br>1 (3)<br>1 (3) |                                       |
|   | AND MOV-225)   | 4 (3)                   |                                       |
|   | ISOLATE 21 RCP seal injection:   |                         |                                       |
|   | <ol> <li>CLOSE MOV-4925</li> <li>CLOSE MOV_250A</li> <li>OPEN SOV-3514 (IVSW between MOV-4925</li> </ol>   | 1 (3)<br>1 (3)          |                                       |
|   | AND MOV-250A)  | 4 (3)                   |                                       |
| III   | ISOLATE 22 RCP seal injection:   |                         |                                       |
|   | <ol> <li>CLOSE Mov-4926</li> <li>CLOSE MOV-250B</li> <li>OPEN SOV-3515 (IVSW between MOV-4926</li> </ol>   | 1 (3)<br>1 (3)          | · · · · · · · · · · · · · · · · · · · |
|   | AND MOV-250B)  | 4 (3)                   | -                                     |
| IV  | ISOLATE 23 RCP seal injection:   |                         |                                       |
|   | <ol> <li>CLOSE MOV-4927</li> <li>CLOSE MOV-250C</li> <li>OPEN SOV-3516 (IVSW between MOV-4927</li> </ol>   | 1 (3)<br>1 (3)          |                                       |
|   | AND MOV-250C)  | 4 (3)                   |                                       |
| Location:   | <ul> <li>MCC 26AA AND MCC 26BB PAB 98 ft. EL (2</li> <li>SI Pump Room PAB 59 ft. EL (Local)</li> <li>Piping Penetration Area PAB 51 ft. EL (Local)</li> <li>IVSW Control Panel PAB 98 ft. EL (Remote)</li> <li>Piping Penetration Area Mezzanine (Local)</li> <li>PAB 15 ft. EL (Local)</li> </ul> |                         |                                       |
| ① The NPO should initial each valving completed space as he properly positions each<br>stop. The Control Room Supervisor (CRS) can remotely position some MOVs; <u>IF</u> he<br>does so, he should initial the valving completed space. |  |                         |                                       |
| ② SM should   | initial those lines which he authorizes to be isola  | ted.                    |                                       |

Title:

**AOI 4.2.4** 

### TRANSFER TO HOT LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F

Revision:

REV. 5

# ATTACHMENT 3 ISOLATIONS FOR LONG TERM RECIRCULATION (Continued)

| Permission@<br>Granted | Valve Operation   | Location                        | on                                     | Valving ① Completed |
|------------------------|---|---------------------------------|--|---------------------|
| v                      | ISOLATE 24 RCP seal injection   |                                 |  |                     |
|                        | <ol> <li>CLOSE MOV-4928</li> <li>CLOSE MOV-250D</li> <li>OPEN SOV-3517 (IVSW between<br/>MOV-4928 AND MOV-250D)</li> </ol>  | 1 (3)<br>1 (3)                  |  |                     |
|                        | ,   | 4(3)                            |  |                     |
| VI                     | ISOLATE RCP seal return:  |                                 |  |                     |
|                        | 1) CLOSE MOV-222  | CCR                             | (3)                                    |                     |
| VII                    | ISOLATE RCP component cooling water:  |                                 |  |                     |
|                        | 1) CLOSE MOV-769 2) CLOSE MOV-797 3) CLOSE MOV-786 4) CLOSE MOV-784 2) CLOSE MOV-789 3) CLOSE FCV-625   | CCR<br>CCR<br>CCR<br>CCR<br>CCR | (3)<br>(3)<br>(3)<br>(3)<br>(3)<br>(3) |                     |
| VIII                   | ISOLATE Containment spray headers:  |                                 |  |                     |
|                        | <ol> <li>CLOSE MOV-869A</li> <li>CLOSE MOV-869B</li> <li>OPEN SOV-3504 (IVSW to MOV-869B)</li> <li>OPEN SOV-3511 (IVSW to MOV-869A)</li> </ol>  | 1 (3)<br>1 (3)<br>4 (5)         |  |                     |
|                        |   | 4(5)                            |  |                     |
| Location:              | MCC 26AA AND MCC 26BB PAB 98 ft. EL (Re<br>SI Pump Room PAB 59 ft. EL (Local)<br>Piping Penetration Area PAB 51 ft. EL (Local)<br>IVSW Control Panel PAB 98 ft. EL (Remote)<br>Piping Penetration Area Mezzanine (Local)<br>PAB 15 ft. EL (Local) |                                 |  |                     |
|                        | should initial each valving completed space as he propervisor (CRS) can remotely position some MOVs; <u>IF</u> he space.  |                                 |  |                     |
| ② SM should            | initial those lines which he authorizes to be isolated.   |                                 |  |                     |

Title:

**AOI 4.2.4** 

### TRANSFER TO HOT LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F

Revision:

REV. 5

# ATTACHMENT 3 ISOLATIONS FOR LONG TERM RECIRCULATION (Continued)

| Permission@<br>Granted  | Valve Operation   | Location  | Valving ① Completed |
|---|---|---|---------------------|
| IX  | ISOLATE RHR system:   |   |                     |
|   | <ol> <li>CLOSE MOV-882</li> <li>CLOSE MOV-744</li> <li>CLOSE 732</li> <li>CLOSE MOV 743</li> <li>CLOSE MOV-1870</li> <li>CLOSE MOV-958 (Sample)</li> <li>OPEN SOV-3500         <ul> <li>(N<sub>2</sub> Gas to 732)</li> </ul> </li> <li>OPEN SOV-3506         <ul> <li>(N<sub>2</sub> Gas to MOV-744)</li> </ul> </li> <li>OPEN SOV-3509         <ul> <li>(N<sub>2</sub> to Gas to sample line)</li> </ul> </li> <li>OPEN SOV-3510</li> </ol> | CCR (6)<br>(3)<br>CCR (3)<br>1(3)<br>1(3)<br>1(5)<br>4(3)<br>4(3)<br>4(5) |                     |
| x   | (N <sub>2</sub> Gas between MOV-743 <u>AND</u> MOV-1870)  ISOLATE recirculation sample line:  | 4(3)  | <del></del>         |
|   | <ol> <li>CLOSE MOV-990A</li> <li>CLOSE MOV-990B</li> <li>OPEN SOV-3505         (N<sub>2</sub> Gas to sample line)</li> </ol>  | 1 (5)<br>1 (5)<br>4 (5)   |                     |
| XI  | ISOLATE N₂ to PRT and RCDT:   |   |                     |
|   | <ol> <li>CLOSE SOV-3418 and SOV-3419 (N₂ to PRT)</li> <li>CLOSE SOV-3415 and SOV-3417 (N₂ to RCDT)</li> </ol>   | 4(3)<br>4(3)  | <u></u>             |
| Location:   | MCC 26AA AND MCC 26BB PAB 98 ft. EL (I<br>SI Pump Room PAB 59 ft. EL (Local)<br>Piping Penetration Area PAB 51 ft. EL (Local<br>IVSW Control Panel PAB 98 ft. EL (Remote)<br>Piping Penetration Area Mezzanine (Local)<br>PAB 15 ft. EL (Local)   | 1)  |                     |
| <ul> <li>The NPO should initial each valving completed space as he properly positions each stop. The Control Room Supervisor (CRS) can remotely position some MOVs; IF he does so, he should initial the valving completed space.</li> <li>SM should initial those lines which he authorizes to be isolated.</li> </ul> |   |   |                     |

### **END OF ATTACHMENT 3**

#### Indian Point 2 Improved Technical Specification Conversion Project

#### M.1 3.5.3: ECCS - Shutdown

#### Par. 3 Category More Restrictive:

#### **DOC Summary:**

Establishes new requirement for two 50% capacity ECCS high head safety injection pumps and one 100% capacity ECCS RHR subsystem (low head) pumps to be OPERABLE to be Operable in Mode 4 to ensure ECCS flow is available to the core following a DBA in Mode 4.

#### Description of Change

CTS 3.3.A.1 establishes requirements for ECCS train (pump) Operability only when the reactor is critical. These requirements are maintained in IP2 ITS LCO 3.5.2 which is applicable in Modes 1, 2 and 3

IP2 ITS 3.5.3 establishes new requirement for ECCS in Mode 4. IP2 ITS 3.5.3 requires Operability of two 50% capacity ECCS high head safety injection (HHSI) pumps and one 100% capacity ECCS RHR subsystem (low head) pumps in Mode 4 to ensure ECCS flow is available to the core following a LOCA in Mode 4.

IP2 iTS 3.5.3 establishes allowable out of service times for ECCS equipment when in Mode 4 as follows: With one of the two required ECCS HHSI subsystems inoperable, the remaining HHSI subsystem and the RHR subsystem maintain substantial capability for the mitigation of a large spectrum of both large and small break LOCAs in Mode 4. Therefore, a Completion Time of 48 hours for restoration of the inoperable subsystem is warranted.

With both of the required ECCS HHSI subsystems inoperable when in Mode 4, the plants capability to respond to a small brak LOCA is significantly degraded. Therefore, a Completion Time of 1 hour for restoration ensures that prompt action is taken to provide the required cooling capacity or to initiate actions to place the plant in MODE 5, where an ECCS subsystem is not required.

With the required ECCS RHR subsystem inoperable when in Mode 4, the plant is not prepared to respond to a loss of coolant accident or to continue a cooldown using the RHR pumps and heat exchangers. The Completion Time of immediately to initiate actions that would restore at least one ECCS RHR subsystem to OPERABLE status ensures that prompt action is taken to restore the required plant cooling capacity.

This LCO is modified by a Note that specifies that an ECCS RHR subsystem may be considered Operable when during alignment and operation for decay heat removal, if capable of being manually realigned (remote or local) to the ECCS mode of operation and not otherwise inoperable. This allows operation in the RHR mode during MODE 4. The ITS Bases for this LCO also clarify that an HHSI subsystem may be considered OPERABLE when injection capability is blocked to meet requirements of LCO 3.4.12 if capable of being manually realigned to the ECCS mode of operation.

#### Justification for Change:

This change is needed to ensure the availability of ECCS injection capability and long term decay heat removal capability in Mode 4 because the potential for a LOCA still exists at reduced temperatures and pressures.

This change is acceptable because single failures are not considered during Mode 4 operation, core cooling requirements lower than those following a DBA initiated from 100% RTP, and there is reduced potential for a LOCA event in Mode 4. Therefore, two 50% capacity ECCS high head safety injection pumps and one 100% capacity ECCS RHR subsystem (low head) pumps will ensure ECCS flow is available to the core following a DBA in Mode 4 even when the pumps are not aligned for automatic injection. This is true because the stable conditions associated with operation in MODE 4 and the reduced probability of occurrence of a Design Basis Accident (DBA) allows the ECCS operational

#### Indian Point 2 Improved Technical Specification Conversion Project

requirements to be reduced.

The equipment required to be Operable by ITS 3.5.3 is sufficient to respond to a LOCA in Mode 4 based assumptions used in the development of he following IP2 procedures:

Abnormal Operating Instruction (AOI) 4.2.2, "LOCA when RCS Temperature is at Least 200 F and Less Than 350 F;"

AOI 4.2.3, "Transfer to Cold Leg Recirculation During LOCA when RCS Temperature is at Least 200 F and Less Than 350 F;" and,

AOI 4.2.4, "Transfer to Hot Leg Recirculation During LOCA when RCS Temperature is at Least 200 F and Less Than 350 F."

These procedures are based on Westinghouse Abnormal Response Guideline (ARG)-2, "Shutdown LOCA," which implements the conclusions identified in WCAP-12476, "Evacuation of LOCA During Mode 3 and Mode 4 Operation for Westinghouse NSSS," dated November 1991. WCAP-12476 used conservative assumptions and was determined to be applicable to all Westinghouse PWRs.

ARG-2 and WCAP-12476 address a LOCA that occurs in Mode 3 after the accumulators are isolated or a LOCA in Mode 4. These evaluations concluded that "establishing safety injection from one high head SI pump within 10 minutes and flow from a second high head safety injection pump within 30 minutes will successfully mitigate a small break LOCA (less than 6 inches in diameter)." The need for the second high head SI pump is limited to the case where the LOCA occurs when the RHR system is aligned for decay heat removal. In this case, there is a potential that RHR pumps are unavailable for safety injection because of void formation in the RHR inlet line due to the temperature of the water in the RHR suction line resulting in a saturation pressure that is less than the NPSH provided by the RWST. ARG-2 and WCAP-12476 conservatively assumed that the total injection flow from the charging pumps and/or high head safety injection pumps is 200 gpm. (This conservatism was selected so that the analysis would apply to plants such as IP2 that are designated as "low head" plants because they do not credit the charging pumps for safety injection.) WCAP-12476, Table 4-8, "Small Break LOCA Analysis without RHR Pumps," identifies the minimum safety injection flow for a 4-Loop plant with HHS1 pumps as 610 gpm at a back pressure of between 100 and 300 psig.

IP2 has 3 High Head Safety Injection Pumps. UFSAR Figure 6.2-6 shows the pump performance curve for these pumps which indicate that the following flow rates:

650 gpm per pump at 635 psig (1500 ft (water) head 400 gpm per pump at 1170 psig (2750 ft (water) head 200 gpm per pump at 1370 psig (1370 ft (water) head

Therefore, IP2 meets WCAP-12476, Table 4-8 assumptions with only 1 HHSI pump; however, IP2 ITS 3.5.3 conservatively requires two HHSI pumps available consistent with AOI 4.2.2. Additionally, for the small break LOCA with RHR, WCAP-12476 assumes that Mode 4 LOCAs are initiated at a pressure less than 1000 PSIG which is consistent with typical Mode 4 conditions. Therefore, one HHSI pump will provide greater than 400 gpm (the amount assumed for two pumps in WCAP-12476). Additionally, the IP2 RHR system relief valve is set at approximately 450 psig. Therefore, if the LOCA occurs when IP2 has RHR in decay heat removal mode, RCS pressure will be less than 450 psig and one HHSI pump will supply at least 650 gpm which is more than the volume assumed to be supplied by two pumps in the WCAP-12476 analysis. Additionally, following ITS conversion, IP2 Technical Requirements Manual (TRM) 3.1.8 will require at least one Operable charging pump when in Mode 4 which will ensure the availability of an additional 80 gpm of high pressure injection capability.

Post accident recirculation requirements for a Mode 4 LOCA are ensured by ITS 3.5.3 by requirements for the Operability of 1 RHR subsystem. Although the required RHR subsystem may be aligned for decay heat removal when in Mode 4, availability of the RHR pump for post LOCA recirculation is assured following both a large and a small break LOCA. As discussed above, IP2 HHSI injection capacity is

#### Indian Point 2 Improved Technical Specification Conversion Project

significantly above the minimum needed to prevent flashing in the RHR pump suction during a small break LOCA. Additionally, Step 1 of IP2 AOI 4.2.2 requires that the RHR pump is stopped immediately to prevent damage if there is any indication of loss of flow to the RHR pump suction during a large break LOCA. Finally, as discussed in the IP2 ITS LCO 3.5.2 Bases, IP2 post LOCA recirculation requirements can be satisfied be either of the two RHR pumps or either of the two Recirculation pumps. Although not specifically required to be Operable in Mode 4, the redundant RHR pump and the two recirculation pumps would typically be available for recirculation if the required RHR pump was unable to perform the recirculation function.

### ATTACHMENT 3 PROCEDURE CHANGE SUMMARY/TECHNICAL REVIEW

Title TRANSFER TO HOT LEG RECIRCULATION DURING LOCA WHEN

RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F

DESCRIPTION OF CHANGE / REASON FOR CHANGE

<<Reason For Change>>

STEP

Step 13.b - Centered table per CR 200109147

GENERAL - Made minor formatting adjustments per GSAD 9 requirements.

The above are administrative changes per SAO-100. A 50.59 screen is not required.

### ATTACHMENT 1 REVISION CHECKLIST

| PROCEDURE NUMBER                              | AUI 4.2.4                          |                                   | Hev         | 5   |
|---|------------------------------------|-----------------------------------|-------------|---|
| ANALYST                                       | T.G. Harvey                        |                                   | Date        | 7/10/03   |
| Procedure Revision Type,                      | Circle One:                        | LIMITED SCOPE                     | ВІ          | ENNIAL*†  |
|   |                                    |                                   |             | <u>-Y/N</u>                                       |
| ALL TPCs incorporated in                      | to this revision *                 |                                   |             | N/A   |
| TPC Cancellation forms co                     | ompleted for each                  | h TPC (List TPCs incorpora        | ted)        | N/A   |
| Non-permanent TPCs re-i                       | <ul><li>ssued or cancele</li></ul> | d                                 |             | N/A   |
| ALL Communications to S                       | taff incorporated.                 | * (List CTSs incorporated)        |             | N/A   |
| List Operator Aids <u>OR</u> Cor              | rective Actions in                 | ncorporated.                      | <del></del> |   |
|   |                                    |                                   | 2           | 200109147   |
| Interfacing Document Refe                     | erence List check                  | ed/updated.                       |             | <u>Y</u>  |
| UFSAR section of the production               | cedure checked/u                   | ıpdated                           |             | <u>Y</u>  |
| Procedure Commitments                         | section checked/u                  | updated <u>AND</u> associated st  | eps ma      | arked * Y   |
| Cross-references in proce                     | dure checked/upo                   | dated (i.e. go to step x, per     | SOP X       | (.X) <u>N</u>                                     |
| ALL Plant Modifications in                    | corporated <u>AND</u>              | procedure nomenclature ag         | įrees w     | rith field * N/A                                  |
| IF instrument is added to (COMMITMENT: 5.2.1) | <u>DR</u> deleted from a           | a log, I&C <u>OR</u> T&P notified |             | N/A   |
| ALL review recommendati                       | ons resolved *                     |                                   |             | Taran Taran San San San San San San San San San S |
| PROCEDURE COORDINA                            | <u>ATOR</u>                        |                                   |             | <u></u>   |
| Incorporated items checke                     | ed as Approved in                  | Generation Support Datab          | ase         |   |
| Procedure meets requirem                      | nents for Biennial                 | review per GSAD 10 <sup>†</sup>   |             | <del></del>                                       |
| SAO 404 and 460 Checkli                       | sts complete as a                  | applicable                        |             |   |
| PROCEDURE ADMINIST                            | RATOR                              |                                   | •           |   |
| Procedure No. Title, and F                    | ?ev No. Entered/L                  | Jpdated in Generation Supp        | oort Da     | tabase  |

<sup>\* &</sup>lt;u>ALL</u> items for each of the questions with \*'s must be incorporated <u>AND</u> <sup>†</sup>GSAD 10 requirements met for the revision to be credited as a biennial review.

# FIGURE 2 TPC CLEARANCE AUTHORIZATION FORM

| PART I                    | <u>AUTHORI</u>  | <u>ZATION</u>             |   |             |
|---------------------------|---|---------------------------|---|-------------|
| TPC #                     |   |                           | Procedure AOI 4.2.                                  | 4           |
| Procedure Ti<br>TEMPERATI | tle <u>TRANSFER TO HOT LEG REC</u><br>JRE AT LEAST 200 °F AND LESS                            | IRCULATION<br>THAN 350 °F | DURING LOCA WHEN<br>-                               | RCS         |
| TPC Descrip               | tion  |                           |   | <del></del> |
| Reason for                | r Clearance: Check applicable box   | <b>x.</b>                 |   |             |
| Other                     | New Procedure Revision Iss  |                           | Conditions no Longer  (OM authorization red  Date / | quired)     |
|                           | •   | GSM)                      |   |             |
| PART II                   | <u>CLEARANCE</u>  |                           |   |             |
| <u>CCR</u>                | TPC Log Index Closed Out TPC Log Copy Removed CCR Controlled Copy                             |                           |   |             |
| <u>Field</u>              | Nuclear NPO Office<br>Conventional NPO Office   |                           |   |             |
| Operations S              | taff Office   |                           |   |             |
|                           | Staff Controlled Copy TPC Log Index Closed Out Revision Control Book Operations Manager Books |                           |   |             |
| <u>Administrativ</u>      | e Copies  |                           |   |             |
|                           | TSC<br>Training<br>Records Management Center  |                           |   |             |
| Additional Co             | ontrolled Copies  |                           |   |             |
|                           |   | <del></del>               |   |             |
|                           | F   |                           |   |             |

### ATTACHMENT I Page 1 of 1

#### SNSC ITEM SUMMARY SHEET

| To: SNSC              | Secretary                                      | Date:           |             |
|-----------------------|--|-----------------|-------------|
| From:                 | Mark Miller                                    |                 |             |
| •                     | (Presenter's Name                              | and Title)      | (Extension) |
| Subject:              | SNSC Agenda Request for SNSC                   | Con:            |             |
| -                     | · · · · · · · · · · · · · · · · · · ·          |                 | (Date)      |
| Department:           | Generation Support                             | -               | NPG         |
| Document No:          | AOI 4.2.4                                      | _               | 5           |
| Document Title:       | TRANSFER TO HOT LEG R<br>RCS TEMPERATURE AT LI |                 |             |
|                       |  |                 |             |
| Brief Summary         | (description of subject, reason for            | changes, etc.): |             |
| See Reason For        | Change Summary                                 |                 |             |
|                       | , <b>,</b>                                     |                 |             |
|                       |  |                 |             |
|                       |  |                 |             |
|                       |  |                 |             |
|                       |  |                 |             |
| List Contents of      | SNSC Package:                                  |                 |             |
|                       |  |                 |             |
|                       |  |                 |             |
| Applicable Refe       | rence Documents:                               |                 |             |
| Applicable Refe       | rence Bocuments.                               |                 |             |
|                       |  |                 |             |
|                       | · · · · · · · · · · · · · · · · · · ·          |                 |             |
| Supervisor's Name and |  |                 | Date:       |
| Signature:            |  |                 | Date.       |
|                       |  |                 |             |

Submit Attachment I (as a cover sheet) and the review document\* to the SNSC Secretary no less than 3 working days prior to the targeted SNSC meeting (Section 4.8.1). If less than 3 working days, the activity will be treated as a "walk-in" (Section 4.7.3).

\* The document should be organized as follows: SAO-460 review package, affected pages of change (if applicable), LAR, TS, or TS Bases changes (entire package), and any other relevant items that would support the review.

# ATTACHMENT III Page 1 of 1

### SNSC REVIEW COVER SHEET

| Originating Document No.:               | AOI 4.2.4  | Revision No.: | 5        |  |  |  |
|---|--|---------------|----------|--|--|--|
| Title: TRANSFER TO H<br>AT LEAST 200 °I | Title: TRANSFER TO HOT LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F |               |          |  |  |  |
|   |  |               |          |  |  |  |
|   |  |               |          |  |  |  |
|   |  |               | İ        |  |  |  |
| SNSC has reviewed this                  | item and has determined that it (check as appropriate):  |               |          |  |  |  |
| SNSC has reviewed this                  | item and has determined that it (check as appropriate):  |               |          |  |  |  |
| Does Does not                           | Require a License Amendment  |               | ļ        |  |  |  |
| Does Does <u>not</u>                    | Adversely impact plant nuclear safety  |               | !        |  |  |  |
| Does <u>not</u>                         | Adversely impact the health and safety of plant perso public   | nnel or the   | ;        |  |  |  |
| Does not                                | Require further review by the Plant Manager, NFSC, individual/group:   | or other      |          |  |  |  |
|   | Plant Manager NFSC Other (specify)   |               |          |  |  |  |
| Remarks:                                |  |               |          |  |  |  |
|   |  |               |          |  |  |  |
|   |  |               |          |  |  |  |
|   |  |               |          |  |  |  |
|   |  |               |          |  |  |  |
|   |  |               |          |  |  |  |
| SNSC recommends this                    | item for:  |               |          |  |  |  |
| Approval                                | Disapproval Other  |               | <u> </u> |  |  |  |
| Completed by:                           | Date Meeting No  |               |          |  |  |  |
| S                                       | NSC Secretary  |               |          |  |  |  |

### TRANSFER TO HOT LEG RECIRCULATION DURING LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F

| Farmer on field o | opy. Valid for 24 hours: |                                       |              |           |
|-------------------|--------------------------|---------------------------------------|--------------|-----------|
| Reviewer /        | Date                     | _                                     | Reviewer / D | ate       |
|                   | BIENN                    | IAL REVIEW                            |              |           |
| <u> </u>          | <del></del>              | · · · · · · · · · · · · · · · · · · · |              |           |
|                   |                          |                                       | Lifet        | uve Date  |
|                   |                          |                                       | Fffec        | tive Date |
|                   | Signature                |                                       |              | Date      |
| Approval:         |                          |                                       |              |           |
|                   | Meeting No. / Date       |                                       |              |           |
| SNSC Review:      |                          | Reviewer:                             |              |           |
| Reviewer:         | -                        | Reviewer:                             |              |           |
| Reviewer:         |                          | Reviewer:                             |              |           |
| Prepared by:      | T.G. Harvey              | Reviewer:                             |              |           |

CONTINUOUS USE

CREW "B"

20011128959

AOI 04-02-04 Rev 5.wpd

### **REVISION PROCESS**

**GSAD 13** 

**Rev. 14** 

### ATTACHMENT 3 PROCEDURE CHANGE SUMMARY/TECHNICAL REVIEW

Procedure No.

**AOI 4.2.2** 

Rev 6

Title

LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS

THAN 350 °F

STEP

DESCRIPTION OF CHANGE / REASON FOR CHANGE

20.b and 23.c - Changed cold overpressure limit margin from 64 psig to 25 psig, refer to calculation FIX-00056 Rev 2

23.a changed condition for checking OPS in service to referring to TS figure 3.1.A-1, refer to calculation FIX-00087 Rev 2

The above changes are covered by Regulatory Evaluation of NET-177-01 (CR 200104118). No 50.59 Screening is required for these changes.

### **REVISION PROCESS**

**GSAD 13** 

**Rev. 14** 

## ATTACHMENT 1 REVISION CHECKLIST

| PROCEDURE NUMBER   | AOI 4.2.2   |   | HeV              | 6                           |
|--|---|---|------------------|-----------------------------|
| ANALYST  | K. BRAGG  |   | Date             | 2/22/02                     |
| Procedure Revision Type,   | Circle One:   | LIMITED SCOPE   | ВІ               | ENNIAL*1                    |
| ALL TPCs incorporated in TPC Cancellation forms co   |   | h TPC (List TPCs incorpora  | ited)            | Y/N<br>NA<br>NA             |
| Non-permanent TPCs re-is ALL Communications to S   |   | ed.<br>I.* (List CTSs incorporated)   |                  | NA                          |
| List Operator Aids OR Cor  | rective Actions in  | ncorporated.  |                  |                             |
| Cross-references in procedular Plant Modifications in IF instrument is added to (COMMITMENT: 5.2.1)  ALL review recommendation PROCEDURE COORDINATION Incorporated items checked Procedure meets requirem SAO 404 and 460 Checklic PROCEDURE ADMINISTI | cedure checked/osection checked/osection checked/up dure checked/up corporated AND DR deleted from ons resolved * ATOR ed as Approved in ents for Biennia sts complete as a RATOR | updated fupdated <u>AND</u> associated stodated (i.e. go to step x, per procedure nomenclature ag a log, I&C <u>OR</u> T&P notified  The Generation Support Databases  I review per GSAD 10 f | SOP X<br>grees w | X.X) Y rith field * NA NA Y |

<sup>\* &</sup>lt;u>ALL</u> items for each of the questions with \*'s must be incorporated <u>AND</u> †GSAD 10 requirements met for the revision to be credited as a biennial review.

### TEMPORARY PROCEDURE CHANGE

OAD 27 Rev. 20

## FIGURE 2 TPC CLEARANCE AUTHORIZATION FORM

PART I <u>AUTHORIZATION</u>

| TPC #         |   | Procedure AOI 4.2.2              |
|---------------|---|----------------------------------|
| Procedure T   | itle LOCA WHEN RCS TEMPERATUR   | E AT LEAST 200 AND LESS THAN 350 |
| TPC Descrip   | otion   |                                  |
| Reason for 0  | Clearance: Check applicable box.  |                                  |
| TPC Expired   | New Procedure Revision Issued   | ☐ Conditions no Longer Exist ☐   |
| Other         |   | (OM authorization required)      |
| Clearance A   | uthorized (OM / AOM / GSM   | Date/_/                          |
| PART II       | CLEARANCE   |                                  |
| <u>CCR</u>    | TPC Log Index Closed Out TPC Log Copy Removed CCR Controlled Copy                             |                                  |
| Field         | Nuclear NPO Office<br>Conventional NPO Office   |                                  |
| Operations S  | Staff Office  |                                  |
|               | Staff Controlled Copy TPC Log Index Closed Out Revision Control Book Operations Manager Books |                                  |
| Administrativ | ve Copies   |                                  |
|               | TSC<br>Training<br>Records Management Center  |                                  |
| Additional Co | ontrolled Copies  |                                  |

| Gu | y Vissing - AOI 04-02-02 | Rev 6.wpd |   |             | Page 6 |
|----|--------------------------|-----------|---|-------------|--------|
| Г  |                          |           |   | <br>        |        |
| -  |                          |           |   |             |        |
| ĺ  |                          |           |   | <br>        |        |
|    |                          |           |   | <del></del> |        |
|    |                          |           |   |             |        |
|    |                          |           |   |             |        |
|    |                          |           |   |             |        |
|    |                          |           |   |             |        |
|    | •                        |           |   |             |        |
|    |                          |           |   |             |        |
|    |                          |           |   |             |        |
|    |                          |           |   |             |        |
|    |                          |           |   |             |        |
| Ì  |                          |           |   |             |        |
| İ  |                          |           |   |             |        |
|    |                          |           |   |             |        |
|    |                          |           |   |             |        |
|    |                          |           |   |             |        |
|    |                          |           |   |             |        |
|    |                          |           |   |             | l      |
|    |                          |           |   |             |        |
|    |                          |           |   |             |        |
|    |                          |           | • |             |        |
|    |                          |           |   |             |        |
|    |                          |           |   |             | -      |
|    |                          |           |   |             |        |
|    |                          |           |   |             |        |
|    |                          |           |   |             |        |
|    |                          |           |   |             |        |
|    |                          |           |   |             |        |
| Ì  |                          |           |   |             |        |
|    |                          |           | · |             |        |
|    |                          |           |   |             |        |
|    |                          |           |   |             |        |
| -  |                          |           |   |             |        |
|    |                          |           |   |             |        |
|    |                          |           |   |             |        |

SAO-404 Rev.

### ATTACHMENT I Page 1 of 1

#### **SNSC ITEM SUMMARY SHEET**

| To: SNSC         | Secretary                          | Date:              |                 |
|------------------|------------------------------------|--------------------|-----------------|
|                  |                                    | <del></del> .      |                 |
| From:            | Mark Miller                        |                    |                 |
|                  | (Presenter's Nam                   | e and Title)       | (Extension)     |
| Subject:         | SNSC Agenda Request for SNS        | C on:              |                 |
|                  |                                    |                    | (Date)          |
| Department:      | Generation Support                 |                    | NPG             |
|                  |                                    | Section:           |                 |
| Document No:     | AOI 4.2.2                          |                    | 6               |
|                  |                                    | Revision:          |                 |
| Document Title:  | LOCA WHEN RCS TEMPE<br>350         | RATURE AT LEAST 20 | 0 AND LESS THAN |
|                  |                                    |                    |                 |
| Brief Summary    | (description of subject, reason fo | r changes, etc.):  |                 |
| See Reason For   | Change Summary                     |                    |                 |
| List Contents of | SNSC Package:                      |                    |                 |
|                  |                                    |                    |                 |
| Applicable Refe  | rence Documents:                   |                    |                 |
| Supervisor's     |                                    |                    |                 |
| Name and         |                                    |                    | Date:           |
| Signature:       |                                    |                    |                 |
|                  |                                    |                    |                 |

Submit Attachment I (as a cover sheet) and the review document\* to the SNSC Secretary no less than 3 working days prior to the targeted SNSC meeting (Section 4.8.1). If less than 3 working days, the activity will be treated as a "walk-in" (Section 4.7.3).

| and the second s | ومستوان ليناه والمناسمة سينبغ فيستر | <ul> <li>Control of Cartain Science and Association</li> </ul> | Australian to daily |
|--|-------------------------------------|--|---------------------|
| Guy Vissing -  | AOI 04-02                           | -02 Rev 6.wr   | od                  |

SAO-404

Rev.

11

\* The document should be organized as follows: SAO-460 review package, affected pages of change (if applicable), LAR, TS, or TS Bases changes (entire package), and any other relevant items that would support the review.

| Guy Vissing | - AOI 04 | -02-02 F | Rev 6.wpd |
|-------------|----------|----------|-----------|
|             |          |          |           |

| Pag | ge | 9 |
|-----|----|---|

SAO-404 Rev. 11

# ATTACHMENT III Page 1 of 1

### SNSC REVIEW COVER SHEET

| Originating Document No.: | AOI 4.2.2                        |               |                         | Revision<br>No.: | 6   |
|---------------------------|----------------------------------|---------------|-------------------------|------------------|-----|
| Title:                    | LOCA WHEN RCS TEMPI              | ERATURE A     | AT LEAST 200 AND I      | LESS THAN        | 350 |
|                           |                                  |               |                         |                  |     |
| SNSC has reviewed th      | is item and has determined t     | hat it (check | as appropriate):        |                  |     |
| SNSC has reviewed thi     | is item and has determined t     | hat it (check | as appropriate):        |                  |     |
| Does Does not             | Require a Licen                  | se Amendme    | ent                     |                  |     |
| Does Does not             | Adversely impa                   |               |                         |                  |     |
| Does <u>not</u>           | Adversely impa                   | ct the health | and safety of plant per | sonnel or the    | :   |
| Does <u>not</u>           | Require further individual/group |               | e Plant Manager, NFS    | C, or other      |     |
|                           | Plant Manager                    | NFSC          | Other (specify)         |                  |     |
| Remarks:                  |                                  |               |                         |                  |     |
|                           |                                  |               |                         |                  |     |
|                           |                                  |               |                         |                  |     |
|                           |                                  |               |                         |                  |     |
| SNSC recommends thi       | s item for:                      |               |                         |                  |     |
| Approval                  | Disapproval                      |               | Other                   |                  |     |

|               |                |      |             | <b>-</b>        |
|---------------|----------------|------|-------------|-----------------|
|               |                |      |             | SAO-404<br>Rev. |
|               | <del></del>    |      |             | 11              |
| Completed by: |                | Date | Meeting No. | _               |
| _             | SNSC Secretary |      |             |                 |
|               |                |      |             |                 |
|               |                |      |             |                 |
|               |                |      |             |                 |
|               |                |      |             |                 |
|               |                |      |             |                 |
|               |                |      |             |                 |
|               |                |      |             |                 |
|               |                |      |             |                 |
|               |                |      |             |                 |
|               |                |      |             |                 |
|               |                |      |             |                 |
|               |                |      |             |                 |
|               |                |      |             |                 |
|               |                |      |             |                 |
|               |                |      |             |                 |
|               |                |      | -           |                 |
|               |                |      |             |                 |
|               |                |      |             |                 |
|               |                |      |             |                 |
|               |                |      |             |                 |
|               |                |      |             |                 |
|               |                |      |             |                 |

| Gu | ıy Vissin | g - AOI 0 | ) <b>4-02-0</b> 2 | Rev 6. | vpd |  |
|----|-----------|-----------|-------------------|--------|-----|--|
|    |           |           |                   |        |     |  |
|    | -         |           |                   |        |     |  |
|    |           |           |                   |        |     |  |
|    |           |           |                   |        |     |  |

Page 11

**AOI 4.2.2** 

Rev.

LOCA WHEN RCS TEMPERATURE AT LEAST 200 AND LESS THAN 350

Preparer: \_\_\_\_\_\_ Reviewer: \_\_\_\_\_

| sing - AOI 04-02-02 Rev 6.wpd |                           |      |                | Pa |
|-------------------------------|---------------------------|------|----------------|----|
|                               |                           |      |                |    |
|                               |                           |      | Issue<br>Date: |    |
|                               |                           |      | <u> </u>       |    |
| Validation of Operations Mana | ager Approval for change: |      |                |    |
|                               | (OM, AOM, SM, GSM)        | Date |                |    |
|                               |                           |      |                |    |
|                               |                           |      |                |    |
|                               |                           |      |                |    |
|                               |                           |      |                |    |
|                               |                           |      |                |    |
|                               |                           |      |                |    |
|                               |                           |      |                |    |
|                               |                           |      |                |    |
|                               |                           |      |                |    |
|                               |                           |      |                |    |
|                               |                           |      |                |    |

INDIAN POINT 2
OPERATIONS

AOI 4.2.2 Revision 6

### LOCA WHEN RCS TEMPERATURE AT LEAST 200°F AND LESS THAN 350°F

| Prepared by:<br>Reviewer:<br>Reviewer:<br>SNSC Review:<br>Approval: | K. BRAGG  Meeting No. / Date | Reviewer: Reviewer: Reviewer: Reviewer: |                   |
|---|------------------------------|---|-------------------|
|   | Signature                    |   | Date              |
|   |                              |   | Effective<br>Date |
| Reviewer  | BIENNIAL<br>/ Date           |   | ewer / Date       |
| For use as field  | copy. Valid for 24 hours:    |   |                   |
|   | 24 Hr Extension:             | Qualified Operator                      | Date / Time       |
|   | 24 Hr Extension:             | Control Room Supervisor                 | Date / Time       |
|   | Z-TH EXCENSION.              | Control Room Supervisor                 | Date / Time       |

### **CONTINUOUS USE**

20022221019

AOI 04-02-02 Rev 06.wpd

A0I 4.2.2

Title:

**ATTACHMENT 1** 

**ATTACHMENT 2** 

**ATTACHMENT 3** 

Revision Number:

REV. 6

48

51

**52** 

| STEP NO | <u>).</u>                        | DESCRIPTION | PAGE NO. |
|---------|----------------------------------|-------------|----------|
| 1.0     | PURPOSE                          |             | 2        |
| 2.0     | SYMPTOMS/ENTRY CONDITIONS        |             | 2        |
| 3.0     | AUTOMATIC ACTIONS                |             | 2        |
| 4.0     | IMMEDIATE OPERATOR ACTIONS       |             | 2        |
| 5.0     | OPERATOR ACTIONS                 |             | 3        |
| 6.0     | REFERENCES                       |             | 47       |
|         | 6.1 <u>DEVELOPMENT DOCUMENTS</u> |             | 47       |
|         | 6.2 INTERFACING DOCUMENTS        |             | 47       |
|         | 6.2.1 PROCEDURES                 |             | 47       |
|         | 6.3 COMMITMENTS                  |             | 47       |
|         | 6.4 <u>UFSAR</u>                 |             | 47       |
| ATT     | ACHMENTS                         |             |          |

THAN 350 °F

**TABLE OF CONTENTS** 

**ISOLATION OF STEAM GENERATOR TUBE LEAK/RUPTURE** 

**NATURAL CIRCULATION VERIFICATION** 

PHASE A AND VENTILATION ISOLATION VALVES

Number: Title: Revision Number:

AOI 4.2.2 LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS REV. 6

### 1. PURPOSE

o This procedure provides instruction to the operator during the abnormal opeating condition in which a LOCA occurs when the Reactor Coolant System (RCS) temperature is greater than 200°F. but less than 350°F.

Title: Number: Revision Number: oF AND LESS AOI 4.2.2

LOCA WHEN RCS TEMPERATURE AT LEAST 200 THAN 350 °F

REV. 6

#### 2. SYMPTOMS/ENTRY CONDITIONS

- a) An uncontrolled Reactor Coolant System (RCS) depressurization.
- b) PRESSURIZER LOW PRESS 2185 PSIG (SAF Window 3-2) alarm.
- c) IF initial RCS pressure was greater than 1940 psig AND the Low Pressure Safety Injection (SI) remains unblocked:
  - 1) PRESSURIZER LOW PRESSURE SI 1840 PSIG alarm (first out).
- d) Uncontrolled decreasing Pressurizer level.
- e) PRESSURIZER LOW LEVEL 18% 5% (SAF Window 3-3) alarm.
- f) PRESSURIZER LO LO LEVEL CHANNEL TRIP 5% (SAF Window 4-3) alarm.
- g) Uncontrolled decreasing margin to saturation.
- h) SATURATION TEMPERATURE MARGIN APPROACHED (FCF Window 4-7) alarm.
- i) Uncontrolled increasing Pressurizer level (vapor space LOCA)
- j) PRESSURIZER HIGH LEVEL 70% 5% (SAF Window 1-3) alarm.
- k) CONTAINMENT HIGH PRESS SI 2 PSIG alarm (first out).
- 1) CONTAINMENT SUMP WATER LEVEL HIGH HIGH (SBF-1 Window 1-1) alarm.
- m) Increasing activity on R-41. Containment Particulate Activity  $\underline{\text{OR}}$  R-42. Containment Gaseous Activity monitors.
- n) R-41/R-42 CNTMT AIR HI RAD/TROUBLE (SAF Window 2-7) alarm.
- o) Increasing activity on R-43. Plant Vent Particulate Activity OR R-44, Plant Vent Gaseous Activity monitors.
- p) R-43/R-44 PLANT VENT HI RAD/TROUBLE (SAF Window 2-8) alarm.
- q) IF initial RCS pressure was greater than 1000 psig AND accumulators remain unisolated:
  - 1) 2X ACCUMULATOR LEVEL HIGH LO (SBF Windows 1-9, 2-9, 3-9, 4-9)alarm.
  - 2) 2X ACCUMULATOR PRESSURE HIGH LOW (SBF-1 Windows 1-10, 2-10, 3-10, 4-10) alarm.
- r) IF Residual Heat Removal System (RHR) is in service. a reduced <u>OR</u> fluctuating RHR flow which could be indication of pump cavitation OR vortexing.

| Number:   | Title:  | <del></del> | Revision Number: |
|-----------|---|-------------|------------------|
| AOI 4.2.2 | LOCA WHEN RCS TEMPERATURE AT LEAST 200<br>THAN 350 °F | °F AND LESS | REV. 6           |

#### 3. <u>AUTOMATIC\_ACTIONS</u>

- a) <u>IF</u> 2185 psig Pressurizer pressure is reached AND Pressurizer level (hot calibrated) is greater than 18 percent, all Pressurizer heaters energize.
- b) <u>IF</u> a pressure of 1840 psig is reached AND Low Pressure Safety Injection (SI) is unblocked OR Containment pressure reaches 2 psig, the following should occur:
  - o Safety Injection is initiated
  - o Containment Phase A Isolation is initiated
  - o Containment Ventilation Isolation is initiated
- c) IF 18 percent Pressurizer level is reached:
  - o LCV-459, Letdown Isolation Stop closes
  - o All Pressurizer heaters de-energize
- d) <u>IF</u> an increasing Pressurizer level of 5 percent above programmed level is reached:
  - o All Pressurizer heaters energize
- e) <u>IF</u> R-41/R-42 CNTMT AIR HI RAD/TROUBLE (high) alarm occurs, Containment Ventilation Isolation is initiated.

#### 4. IMMEDIATE OPERATOR ACTIONS

o None

| Ī      | Number:             | Title:  |                                 |   | Revision Number:         |
|--------|---------------------|---|---------------------------------|---|--------------------------|
|        | AOI 4.2.2           | LOCA WHEN RCS TEMPERAT  | URE AT LEAST 200<br>THAN 350 °F | °F AND LESS                                   | REV. 6                   |
|        |                     |   | _                               |   |                          |
| 1      | STEP                | ACTION/EXPECTED RESPONSE  | RESP                            | ONSE NOT OBTAINED                             |                          |
|        | L                   |   | J                               |   |                          |
| i      | * * *               | * * * * * * * * * * * *   | * * * * * * * * * * CAUTION     | * * * * * * * * * *                           | * * * * * * *            |
|        | * 0                 | Prior to dispatching personnel to the local environmental conditions of the local environmental conditions. |                                 |   | * * *                    |
|        | _                   | <u>IF</u> conditions to cause an automa<br><u>NOT</u> occurred, a manual SI shall                           |                                 |   | *                        |
|        | * * *               | * * * * * * * * * * * * *   | * * * * * * *                   | * * * * * * * * * *                           | * * * * * * *            |
| ষ্পষ   | ষ্প্ৰস্থ্ৰস্থ       | නු අතු අතු අතු අතු අතු අතු අතු අතු අතු අත   | 8880                            | ু বিষয় বিষয় বিষয় বিষয় বিষয় বিষয় বি      |                          |
|        |                     |   | <u>NOTE</u>                     |   | <u> </u>                 |
|        | © Adv<br>© 1ev<br>© | erse Containment conditions are<br>els ever exceed 1E5 R/h OR Co <u>nt</u>                                  | <u>a</u> inment pressure        | remains above 4 psig.                         | 0<br>0<br>0              |
| ষ্বস্থ |                     | ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼<br>ਸ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼  |                                 | ; প্ৰথ <b>প্ৰথ</b> প্ৰথপ্ৰথ                   | , ব্যব্যব্যব্যব্যব্য<br> |
|        |                     | CHECK IF RHR Pumps Should Be<br>Stopped:  | _                               |   |                          |
|        | č                   | a. CHECK the following:   |                                 | none of the conditions tisfied, GO TO Step 2. |                          |
|        |                     | o PRZR level -LESS THAN 14%<br>[33% FOR ADVERSE CONTAINME   |                                 |   |                          |
|        |                     | - OR -  |                                 |   | <u> </u>                 |
|        |                     | o RCS subcooling based on co<br>exit TCs - LESS THAN VALUE<br>OBTAINED IN TABLE BELOW                       |                                 | •   |                          |
|        | н<br>п              | (, 555)   | ING °F ¤<br>AINMENT)¤           |   |                          |
|        |                     | <i>የውፅቀቀቀቀቀቀቀቀቀቀቀቀቀቀቀቀቀቀቀቀ</i>  |                                 | <i><b><b><i><b>¢</b>¢¢¢¢</i>¢¢¢¢¢</b></b></i> | l                        |
|        |                     | 0 - 400 H 52 (83)<br>401 - 800 H 36 (49)  |                                 |   |                          |
|        | н                   | 801 - 1200 × 23 (30)  | Ħ                               |   |                          |
|        |                     | 1201 - 2500 ¤ 19 (26)<br>፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟   |                                 | <i>ጜጜጜጜጜጜጜጜጜጜጜ</i> ፚ                          | j                        |
|        |                     | - OR -  | · · · · · · · · · · · · · · · · | ****  |                          |
|        |                     | OK -  |                                 |   |                          |

| Number:   | Title:   |                           | Revision Number: |
|-----------|--|---------------------------|------------------|
| AOI 4.2.2 | LOCA WHEN RCS TEMPERATURE AT I   | LEAST 200                 | REV. 6           |
| STEP -    | ACTION/EXPECTED RESPONSE   | RESPONSE NOT OBTAINED     |                  |
|           | <ul> <li>STOP RHR pumps AND_place<br/>switches in PULL OUT</li> </ul>                          |                           |                  |
|           | c. CLOSE RHR Hot Leg Suction Stops   |                           |                  |
|           | o MOV-730  |                           |                  |
|           | - AND -  |                           |                  |
|           | o MOV-731  |                           |                  |
|           | d. CONSULT Shift Manager (SM) to<br>DETERMINE IF_valve 732. Inlet<br>Line CIV should be closed | d. GO TO Step 2           |                  |
|           | e. CLOSE valve 732   |                           |                  |
| 2.        | ISOLATE RCS Letdown:   |                           |                  |
|           | a. CHECK CVCS letdown valves - CLOSED  | a. Manually CLOSE valves  |                  |
|           | o 200A<br>o 200B<br>o 200C<br>o LCV-459<br>o 213   |                           |                  |
|           | <ul><li>b. CHECK HCV-133, RHR letdown valve - CLOSED</li></ul>                                 | b. Manually CLOSE HCV-133 |                  |
|           |  |                           |                  |
|           |  |                           |                  |
|           |  |                           |                  |
|           |  |                           |                  |
|           |  |                           |                  |
|           |  |                           |                  |
|           |  |                           |                  |

Title: Number: Revision Number: LOCA WHEN RCS TEMPERATURE AT LEAST 200 F AND LESS A0I 4.2.2 REV. 6 THAN 350 °F **STEP** ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED 3. CHECK IF Charging Flow Is Adequate: a. ADJUST charging flow as necessary to maintain pressurizer level b. CHECK PRZR level: b. Go to Step 4. o GREATER THAN 14% [33% FOR ADVERSE CONTAINMENT o STABLE OR INCREASING c. RCS subcooling based on core c. Go to Step 4. exit TCs- GREATER THAN VALUE

OBTAINED FROM TABLE BELOW

**▼♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥ ¤WR RCS PRESSURE ¤ RCS SUBCOOLING** °F **¤** 

¤ (PSIG) ¤(ADVERSE CONTAINMENT)¤ ታዔዔዔዔዔዔዔዔዔዔዔዔዔዔዔዔዔዔዔዔዔዔዔዔዔዔጜጜጜጜጜ

 н
 0 - 400
 н
 52 (83)
 н

 н
 401 - 800
 н
 36 (49)
 н

 н
 801 - 1200
 н
 23 (30)
 н

 н
 1201 - 2500
 н
 19 (26)
 н

- d. Charging flow LESS THAN
  CAPACITY OF TWO CHARGING PUMPS
- d. Go to Step 4.
- e. RETURN TO POP OR SOP in effect to RESTORE the remainder of the RCS/CVCS/RHR systems to pre-event status
  - REFER TO AOI 1.7. Excessive Reactor Coolant System Leakage. to aid in determining the source of leakage

Number: Title: Revision Number: LOCA WHEN RCS TEMPERATURE AT LEAST 200 F AND LESS AOI 4.2.2 REV. 6 THAN 350 °F

**STEP** 

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

CAUTION

IF RWST level decreases to less than 9.24 ft AND SI is aligned to the RWST, the SI System should be aligned for cold leg recirculation per AOI

4.2.3 (Transfer to Cold Leg Recirculation During LOCA When RCS

Temperature At Least 200 °F And Less Than 350 °F).

- VERIFY Proper SI System Alignment
  - a. SI pump cold leg injection valves - OPEN
- a. Manually OPEN valves

- o 856A
- o 856E
- o 856C
- o 856D
- b. 22 SI pump suction stops OPEN b. Manually OPEN valves

- o 887A
- o 887B
- c. 22 SI pump discharge isolations - OPEN
- c. Manually OPEN valves

- o 851A
- o 851B
- d. RHR hot leg suction stops -**CLOSED** 
  - o MOV-730
  - o MOV-731

- d. PERFORM the following
  - 1) VERIFY RHR pumps are secured AND in PULL OUT
    - o 21 RHR Pump
    - o 22 RHR Pump
  - 2) CLOSE 730 AND 731
  - 3) CONSULT SM to determine IF valve 732. Inlet Line CIV should be closed
    - a) IF directed by SM. CLOSE valve 732

Title: Number: Revision Number: LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS AOI 4.2.2 REV. 6 THAN 350 °F **STEP** ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED e. SI pumps - NONE RUNNING e. GO TO Step 4i f. CHECK the following: f. IF neither condition satisfied, GO TO Step 5 o PRZR level -LESS THAN 14% [33% FOR ADVERSE CONTAINMENT] - OR o RCS subcooling based on core exit TCs - LESS THAN VALUE **OBTAINED FROM TABLE BELOW:** #WR RCS PRESSURE # RCS SUBCOOLING °F # #(ADVERSE CONTAINMENT)# (PSIG) 0 - 400 52 (83) Ħ ц Д 401 - 800 36 (49) ц Ħ 801 - 1200 23 (30) Ħ Ħ **¤** 1201 - 2500 Ħ 19 (26) g. START 21 SI pump g. PERFORM the following: 1) VERIFY MOV-851B, 22 SI Pump Tie Valve To Outlet of 23 SI Pump is CLOSED 2) START 22 SI Pump a) IF 22 SI Pump will NOT \_ start, START 23 SI Pump

| Number: Title:   | Revision Number:   |
|--|--|
| AOI 4.2.2 LOCA WHEN RCS TEMPERATURE AT L THAN 3                          |  |
| STEP — ACTION/EXPECTED RESPONSE  | RESPONSE NOT OBTAINED  |
| h. CHECK 22 SI pump - OFF  | h. IF 22 SI Pump is running due to SI actuation AND_either 21 OR 23 SI Pump is NOT_running. PERFORM the following:  1) IF 21 AND 22 SI Pumps running. PERFORM the following:  a) VERIFY MOV-851B - OPEN b) VERIFY MOV-851A - CLOSED c) GO TO Step 4i  2) IF 22 AND 23 SI Pumps running. PERFORM the following:  a) VERIFY MOV-851A - OPEN b) VERIFY MOV-851B - CLOSED c) GO TO Step 4i  3) IF only 22 SI Pump running. PERFORM the following: a) OPEN AND DE-ENERGIZE either MOV-851B OR MOV-851B b) GO TO Step 4i |
| <ul> <li>i. PLACE N<u>ON-RUNNING SI</u> Pumps in<br/>PULL OUT</li> </ul> |  |
| 5. EVACUATE Non-essential Personnel In Containment                       |  |

Number: Title: Revision Number: LOCA WHEN RCS TEMPERATURE AT LEAST 200 of and less A0I 4.2.2 REV. 6 THAN 350 °F STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED VERIFY Containment Isolation 6. Phase A: a. Phase A valves - CLOSED PER a. Manually ACTUATE Phase A AND ATTACHMENT 3 manually CLOSE valves. b. IVSW valves - OPEN: b. Manually OPEN valves o 1410 o 1413 o SOV-3518 o SOV-3519 c. WCP valves - OPEN: c. Manually OPEN valves o PCV 1238 o PCV 1239 o PCV 1240 o PCV 1241 d. PLACE personnel AND\_equipment hatch solenoid control switches on CCR Panel SM to INCIDENT

|     | Number:<br>AOI 4.2. | .2              | Title:<br>LOCA WHEN RCS TEMPERATURE A<br>TH/  | AT LEAST 20<br>AN 350 °F | 00 °F AND LESS  | Revision Number:         |
|-----|---------------------|-----------------|---|--------------------------|---|--------------------------|
| ļ   | STEP                | — A0            | TION/EXPECTED RESPONSE  | RI                       | ESPONSE NOT OBTAINED  |                          |
| ୪୪୪ |                     |                 |   |                          | <b>44444444</b> 44  |                          |
|     | 0000                | throug<br>occur | the normal requirements for trip<br>hout this procedure. Step 7 lists<br>in this procedure.         | s those tha              | at are most likely to   | (O)<br>(O)<br>(O)<br>(O) |
| aaa |                     |                 | ඁ<br>෫෧෮෧෮෧෮෧෮෧෮෧෮෧෮෧෮෧෮෧෮෧෮෧෮෧෮෧෮෧෮෧෮෧෮෧෮෧෮  |                          | addddddddd  | qqqqqqqqqq               |
|     | 7.                  |                 | CK IF RCPs Must Be Stopped: CHECK the following:  | a.                       | <u>IF</u> neither condition   |                          |
| `   |                     |                 | o Number 1 seal differential<br>pressure - LESS THAN 200 PSID                                       |                          | satisfied. GO TO Step   | ) 8.                     |
|     |                     |                 | - OR -  o Number 1 seal leakoff flow - LESS THAN 0.2 gpm AND <u>sea</u> l temperatures - INCREASING |                          |   |                          |
|     |                     | b.              | STOP affected RCP(s)  |                          |   |                          |
|     | 8.                  | Rest            | PATCH Personnel To Locally core Power To selected pment   |                          |   |                          |
|     |                     | a.              | RESET Lighting  |                          |   |                          |
|     |                     |                 | RESET A <u>LL M</u> CCs except MCC 28<br>AND MCC 28A  |                          |   |                          |
|     |                     |                 | CHECK MCC 28 AN <u>D MC</u> C 28A -<br>TRIPPED  | c.                       | <u>IF</u> Containment Sump 1<br>greater than 44 feet<br>TRIP MCC 28 AND MCC 2 | 3 inches.                |
|     |                     |                 |   |                          |   |                          |
|     |                     |                 |   |                          |   |                          |
|     |                     |                 |   |                          |   |                          |

| Number:   | Title:  |             | Revision Number: |
|-----------|---|-------------|------------------|
| AOI 4.2.2 | LOCA WHEN RCS TEMPERATURE AT LEAST 200<br>THAN 350 °F | °F AND LESS | REV. 6           |

STEP ACTION/EXPECTED RESPONSE

## 9. <u>CHECK IF RHR Pump Aligned In SI</u> Mode:

a. MOV-882, RHR Pump Suction From RWST - OPEN

## RESPONSE NOT OBTAINED

CONTINUE with Step 12 while PERFORMING the following:

- a. ALIGN RHR pump suction to RWST as follows:
  - IF RCS hot leg temperature less than 250°F. OPEN MOV-882, RHR Pump Suction From RWST.
  - 2) <u>IF</u> RCS hot leg temperature greater than 250°F, PERFORM the following:
    - a) OPEN 201 AND 202, Letdown Line Isolation Stops
    - b) PLACE PCV-135, Letdown Backpressure Control in MANUAL AND OPEN fully
    - c) PLACE LCV-112A. Normal/Divert VCT Tank Inlet to DIVERT
    - d) Fully OPEN HCV-133. RHR Letdown Flow Control
    - e) <u>WHEN</u> RHR Pump Suction Temperature is 250°F OR less, PERFORM the following:
      - CLOSE the following valves:
        - o HCV-133
        - o 201
        - o 202
      - 2. PLACE LCV-112A. Normal/Divert VCT Tank Inlet to AUTO
      - 3. OPEN MOV-882

| Number:    | Title:  |   | Revision Number: |
|------------|---|---|------------------|
| AOI 4.2.2  | LOCA WHEN RCS TEMPERATURE AT<br>THAN                | LEAST 200 °F AND LESS<br>350 °F   | REV. 6           |
| STEP       | ACTION/EXPECTED RESPONSE                            | RESPONSE NOT OBTAINED   |                  |
| المسمعيسيا | b. MOV-744, RHR Discharge Stop -<br>OPEN            | b. Manually OPEN MOV-744  |                  |
|            | c. RHR heat exchanger MOVs - OPEN                   | c. Manually OPEN valves   |                  |
|            | o 745A<br>o 745B<br>o 746<br>o 747                  |   |                  |
|            | d. RHR heat exchanger Flow<br>Control Valves - OPEN | d. Manually OPEN valves   |                  |
|            | o 638<br>o 640                                      |   |                  |
| 10.        | CHECK IF CCW Pumps Aligned In SI Mode:              |   |                  |
|            | a. VERIFY at least one CCW Pump - RUNNING           | <ul> <li>VERIFY Auxiliary Component<br/>Cooling - RUNNING</li> </ul>                  |                  |
|            |   | <ol> <li><u>WHEN_CCW</u> pump becomes<br/>available. START one CC<br/>Pump</li> </ol> | W                |
|            | b. OPEN RHR Heat Exchanger CCW<br>Outlet Valves:    |   |                  |
|            | o 822A<br>o 822B                                    |   |                  |
|            |   |   |                  |
|            |   |   |                  |
|            |   |   |                  |
|            |   |   |                  |
|            |   |   |                  |
|            |   |   |                  |

Title: Number: Revision Number: A0I 4.2.2 REV. 6 THAN 350 °F

STEP ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

- 11. CHECK IF RHR Flow Required:
  - a. RCS subcooling based on core  $$\tt a.~60~T0~Step~12.$$ exit TCs - LESS THAN VALUE **OBTAINED FROM TABLE BELOW:**

#WR RCS PRESSURE # RCS SUBCOOLING °F # # (ADVERSE CONTAINMENT) # (PSIG) 0 - 400 ¤ 52 (83) Ħ 36 (49) Ħ 401 - 800 Ħ 801 - 1200 🕱 23 (30) Ħ # 1201 - 2500 # 19 (26) 

- b. RHR Pump suction temperature b. GO TO Step 12 LESS THAN OR EQUAL TO 250°F

c. START one RHR pump

|            | Number:          |                  | Title:   |                                    |                          |  |                 |                   |                                       |  | Revis         | ion Number:                              | N             |
|------------|------------------|------------------|--|------------------------------------|--------------------------|--|-----------------|-------------------|---------------------------------------|--|---------------|--|---------------|
|            | AOI 4.2          | .2               | LOCA I   | WHEN RCS TE                        | MPERAT                   |  | LEAST<br>350 °  |                   | °F AN                                 | D LESS                                   |               | REV. 6                                   |               |
|            | STEP             | A                | CTION/EXPECT   | ED RESPONSI                        |                          | ]  |                 | RESPONS           | E NOT OBT                             | AINED                                    | ]             |  | <b>=</b><br>7 |
| ষ্বপ্ৰ     |                  |                  | গুরুষ্থ্যমূষ্ট্র<br>গুরুষ্থ্যমূষ্  |                                    |                          |  |                 | aaaa              | ।<br>বিষষ্                            | abbbb                                    | <b>୪</b> ୪୪୪୪ | <b>AAAAAA</b><br>0                       | øs            |
|            | 0<br>0<br>0<br>0 | exit 1<br>additi | to making the control of the control | e allowed t<br>unning shou         | o stab<br>ild be         | ilize<br>observ                                | OR a fo<br>ed.  | ur <u>th</u> er i | ncrease w                             | ith the                                  | <<<<<         | <i>୭</i><br>ଡ<br>ଡ<br>ଡ<br>ଅଧ୍ୟୁଷ୍ୟୟୁଷ୍ୟ | a x           |
| <b>BBB</b> |                  | <b>ক্ষিক্ষ</b>   | スタススス<br>IFY Adequate  | ।ব্যব্যব্যব্                       |                          |  |                 | ,-,-,-            | ,-,-,-,-,-                            | -, |               |  |               |
|            |                  | a.               | CHECK RVLIS<br>GREATER THAI<br>FROM TABLE I  | indication<br>N VALUE OBT          |                          |  | a               |                   | one addi<br>referred)                 |  | I pump        |  |               |
|            |                  | A                | <i><b><b><i><b>6</b> </i></b></b></i>  | <i>\$</i> @\$\$\$                  |                          | <i>&amp;&amp;&amp;</i>                         | <i>\$\$</i> \$0 |                   | _ 22 SI Pi<br><u>ኔ</u> ቌ፝፝፝፝፝፝፝፟፝፝፟፟፟ |  | nning<br>-    |  |               |
| i          |                  | ппп              | D either 21<br>NO. OF ¤RVI<br>RCPS ¤ C<br>RUNNING¤   | LIS NATURAL<br>IRCULATION<br>RANGE | ¤RVLI:<br>¤ RUN<br>¤ RAI | NING =<br>NGE =                                | t<br>t          | ar<br>Va          | NOT runi<br>opropriate                | Outlet<br>LOSED                          |               |  | 1             |
|            |                  | д<br>ц           | <b>ቴቴቴቴቴ</b><br>0 ¤<br>1 ¤<br>2 ¤  | 62 <b>%</b>                        | п ц                      | > <b>፟</b> ፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟ |                 |                   | 21 Pump                               |  | - 851A        |  |               |
|            |                  | n<br>n           | 3 ¤  | <i>\$\$\$</i>                      | n<br>n                   | 44%<br>63%                                     | n<br>n          |                   | 23 Pump                               | running -                                | · 851B        |  | 1             |
|            |                  | b.               | CHECK core (   | exit TCs -                         |                          |  |                 | . START           | one addi<br>referred)                 | tional Si                                | [ Pump        |  |               |
|            | 13.              |                  | CK RCS Hot L<br>BLE  | <u>eq Temperat</u>                 | tures -                  |  | f               | low as n          | team dump<br>ecessary<br>ratures.     |  | _             |  |               |
|            |                  |                  |  |                                    |                          |  | a               | avail             | ndenser s<br>able. OPE<br>dumps       |  |               | _  |               |
|            |                  |                  |  |                                    |                          |  |                 |                   |                                       |  |               |  |               |
|            |                  |                  |  |                                    |                          |  |                 |                   |                                       |  |               |  |               |

Title: Number: Revision Number: LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS AOI 4.2.2 REV. 6 THAN 350 °F **STEP** ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED 14. INITIATE Evaluation Of Plant Status: a. CHECK Plant Vent Particulate
AND Gaseous Activity Monitors a. START R-43 AND R-44 per SOP 12.3.2, Digital Radiation - IN SERVICE Monitoring System Operation (Local Or SRD) o R-43 o R-44 b. RESTORE PAB ventilation per SOP 11.1 (Ventilation System Operation) c. CHECK PAB radiation - NORMAL c. ISOLATE CVCS OR RHR breaker in o R-43 o R-44 1) REFER TO Emergency Procedures Document Book 1. o R-4 o R-5987 **Emergency Classifications** d. CHECK indications in d. ISOLATE RCS, CVCS OR RHR break Containment - NORMAL in Containment o R-25 OR R26 1) REFER TO Emergency o R-41 OR R42 traces prior to Procedures Document Book 1. Phase A and Ventilation Emergency Classifications Isolation o R-2 OR R-7 o Containment Pressure o Containment Humidity o Containment Sump Level o Recirculation Sump Level o Reactor Cavity Sump Level e. CHECK Steam Generator status e. ISOLATE affected Steam NORMAL Generator per ATTACHMENT 1 (Isolation of Steam Generator o R-45 Tube Leak/Rupture) o R-49 o R-28, R-29, R-30 OR R-31 o Steam Generator level -CONTROLLABLE This Step continued on the next page.

Number: Title: Revision Number: LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS A0I 4.2.2 REV. 6 THAN 350 °F **STEP** ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED f. Evaluate and operate plant equipment as necessary: o CCW Pumps - 2 RUNNING o Essential SW Pumps -MAINTAINING 53-125 PSIG o Non-Essential SW Pumps - AT LEAST ONE RUNNING o EDGs - NOT RUNNING o VERIFY FCV-1176 AND\_\_\_\_ FCV-1176A OPEN o Containment Fan Cooler Units o PERFORM the following - ALL RUNNING IN INCIDENT MODE 1) START ALL available Fan Cooler Units per SOP 10.3 (Containment Cooling System Operation) o CHECK DC Bus Trouble Alarms o VERIFY MCCs energized - CLEAR o MCC 24A o MCC 26C o MCC 27A o MCC 29A o CHECK Battery Bus voltage -NORMAL

STEP — ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

CAUTION

IF offsite power is lost after the SI is RESET, manual action may be required to restart safeguards equipment.

- 15. RESET SI
  - a. CHECK SI ACTUATED

- a. GO TO Step 16
- b. VERIFY Automatic Safeguards Actuation key switches in DEFEAT Panel SB-2)
  - o Train A SIA-1
    - AND -
  - o Train B SIA-2
- c. One at a time. DEPRESS Safety Injection reset buttons (Panel SB-2)
  - o Train A
  - o Train B
- d. VERIFY SI Train A AND <u>Train B</u>RESET
- d. VERIFY relays reset (Top of Safeguards Initiation Tacks 1-1 AND 1-2):
  - o SAI-1
  - o SIM-1
  - o SIA-2
  - o SIM-2

STEP ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

- 16. <u>RESET Containment Isolation</u>
  Phase A
  - a. PLACE IVSW switches to OPEN (Panel SN)
    - o 1410
    - o 1413
    - o SOV-3518
    - o SOV-3519
  - b. PLACE CNTMT RAD MON WCPS VALVES control switch to OPEN (Panel SN)
  - PLACE personnel AND equipment hatch solenoid control switches to INCIDENT (Panel SM)
  - d. PLACE control switches for all remaining Phase A isolation valves to CLOSE (Panel SN)
  - e. One at a time, DEPRESS Phase A reset buttons
    - o CI Phase A Train A
    - o CI Phase A Train B

| Number:   | Title:                                     | Revision Number:   |
|-----------|--|--|
| A0I 4.2.2 | LOCA WHEN RCS TEMPERATURE<br>TH            | AT LEAST 200   |
| STEP      | ACTION/EXPECTED RESPONSE                   | RESPONSE NOT OBTAINED  |
|           | VERIFY Phase A Train A AND Train B - RESET | f. PERFORM the following  1) VERIFY correct switch positions per steps 16a through 16d  2) One at a time. DEPRESS Phase A reset buttons  o CI Phase A Train A o CI Phase A Train B  3) IF signal does NOT_reset. PERFORM the following:  a) PLACE keyed switches to BYPASS  b) One at a time. DEPRESS Phase A reset buttons  o CI Phase A Train A o CI Phase A Train B  4) IF signal can NOT_be reset. RESET relays on top of Safeguards Initiation Racks 1-2 AND 2-2  o CA1 o CA2 |
|           | TABLISH Instrument Air To ntainment:       |  |
| a.        | OPEN PCV-1228                              | a. VERIFY relays on top of Safeguards Initiation Racks 1-2 AND 2-2 - RESET  o CA1 o CA2  |

Title: Number: Revision Number: LOCA WHEN RCS TEMPERATURE AT LEAST 200 of AND LESS AOI 4.2.2 REV. 6 THAN 350 °F **STEP** ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED

- 18. CHECK IF RHR Flow Required:
  - a. RCS subcooling based on core exit TCs - LESS THAN VALUE OBTAINED FROM TABLE BELOW:
- a. GO TO Step 19

#WR RCS PRESSURE # RCS SUBCOOLING °F # #(ADVERSE CONTAINMENT)# (PSIG) 0 - 400 Ħ 52 (83) Ħ п 401 - 800 Ħ 36 (49) п 801 - 1200 Ħ 23 (30) Ħ # 1201 - 2500 # 19 (26) Ħ 

- b. RHR pump suction temperature -LESS THAN OR EQUAL TO 250 °F
- b. PERFORM the following:
  - 1) OPEN 201 AND 202, Letdown Line Isolation Stops
  - 2) PLACE PCV-135, Letdown Backpressure Control in MANUAL AND OPEN fully
  - 3) PLACE LCV-112A Normal/Divert VCT Tank Inlet to DIVERT
  - 4) Fully OPEN HCV-133, RHR Letdown Flow Control
  - 5) WHEN RHR pump suction temperature is 250 °F OR less. PERFORM the following:
    - a) CLOSE the following valves:
      - o HCV-133
      - o 201
      - 0 202
    - b) PLACE LCV-112A Normal/Divert VCT Tank Inlet to AUTO
    - c) START one RHR pump

| Number:   | Title:  |             | Revision Number: |
|-----------|---|-------------|------------------|
| A0I 4.2.2 | LOCA WHEN RCS TEMPERATURE AT LEAST 200<br>THAN 350 °F | °F AND LESS | REV. 6           |

| STEP | ACTION/EXPECTED RESPONSE                                   | RESPONSE NOT OBTAINED  |
|------|--|--|
| 19.  | CHECK PRZR PORV Block Valves:                              |  |
|      | <ul><li>a. Power to block valves -<br/>AVAILABLE</li></ul> | <ul> <li>a. RESTORE power to block valves<br/>by closing the following<br/>breakers as necessary:</li> </ul> |
|      |  | o MCC 26B/1H (MOV-535)<br>o MCC 26A/1H (MOV-536)   |
|      | b. Block valves - AT LEAST ONE<br>OPEN                     | <ul> <li>OPEN one block valve unless it<br/>was closed to isolate an open<br/>PORV.</li> </ul>               |
|      |  |  |
|      |  |  |
|      |  |  |
|      |  |  |
|      |  |  |
|      |  |  |
|      |  |  |
|      |  |  |
|      |  |  |
|      |  |  |
|      |  |  |
|      |  |  |
|      |  |  |
|      |  |  |
|      |  |  |

| ŀ | * | * | * | * | * | * | * | * |  |
|---|---|---|---|---|---|---|---|---|--|
|   |   |   |   |   |   |   |   | * |  |
|   |   |   |   |   |   |   |   | * |  |
|   |   |   |   |   |   |   |   | * |  |
|   |   |   |   |   |   |   |   |   |  |

STEP ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

## CAUTION

IF any PRZR PORV opens because of high pressure. Step 20 should be repeated after pressure decreases to less than the PORV setpoint.

- 20. CHECK IF PRZR PORVs Should Be Closed:
  - a. CHECK Cold Overpressure Protection System - IN SERVICE
  - b. CHECK RCS pressure AT LEAST 25 PSIG BELOW CALCULATED COLD OVERPRESSURE LIMIT
- a. Go to Step 20d.
- b. PERFORM the following:
  - VERIFY at least one PRZR PORV OPEN
  - 2) CONTINUE with Step 21 AND WHEN pressure less than setpoint. PERFORM Step 20e.

- c. GO TO Step 20e.
- d. CHECK PRZR pressure LESS THAN 2335 PSIG PSIG
- d. PERFORM the following:
  - 1) VERIFY at least one PRZR PORV OPEN
  - 2) CONTINUE with Step 21 AND WHEN pressure less than setpoint, PERFORM Step 20e.

- e. CHECK PRZR PORVs CLOSED
- e. PERFORM the following:
  - 1) Manually CLOSE PORV
  - IF any valve can NOT be closed. THEN manually CLOSE associated block valve.

n n n

STEP — ACTION/EXPECTED RESPONSE — RESPONSE NOT OBTAINED

CAUTION

RCS pressure should be monitored. If RCS <u>pressure</u> decreases in an uncontrolled manner to less than 320 psig psig [340 psig psig for adverse containment], the RHR pumps must be manually restarted to supply water to the RCS.

21. CHECK IF RHR Pumps Should Be Stopped:

a. CHECK RCS pressure:

- a. Go to Step 22.
- o Pressure GREATER THAN 320 PSIG PSIG [340 PSIG PSIG FOR ADVERSE CONTAINMENT]

- AND -

- o Pressure STABLE OR INCREASING
- b. STOP RHR pumps AND place in AUTO

Number:

Title:

LOCA WHEN RCS TEMPERATURE AT LEAST 200 THAN 350 °F

of and less

REV. 6

Revision Number:

STEP

AOI 4.2.2

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

CAUTION

Alternate water sources for AFW pumps will be necessary if CST level decreases to less than 2 ft.

22. CHECK SG Levels:

- a. CHECK Narrow range level GREATER THAN 10% [27% FOR
  ADVERSE CONTAINMENT]
- b. CONTROL feed flow to maintain narrow range level between 10% [27% for adverse containment] and 50%
- a. MAINTAIN total feed flow greater than 400 gpm until narrow range level greater than 10% [27% for adverse containment] in at least one SG.
- b. <u>IF</u> narrow range level in any SG continues to increase, STOP feed flow to that SG.

| Number:      |       | Title:   |                            | === | Revision Number:  | 1    |
|--------------|-------|--|----------------------------|-----|---|------|
| AOI 4.2.2    |       | LOCA WHEN RCS TEMPERATI  | JRE AT LEAS<br>THAN 350    |     | 00 °F AND LESS REV. 6   |      |
| <u></u>      |       |  |                            |     |   | -    |
| STEP         | AC    | TION/EXPECTED RESPONSE   |                            | RI  | ESPONSE NOT OBTAINED  | Ì    |
| * * :        | * *   | * * * * * * * * * * *  | * * * * * • CAUTION        |     | *   |      |
| * <u>o</u> t | pened | Pressurizer PORV opens becau<br>. Step 23c should be repeated<br>he PORV setpoint.   |                            |     |   |      |
| * *          | * *   | * * * * * * * * * * *  | * * * * *                  | * * | * * * * * * * * * * * * * * * * *   |      |
| 23.          |       | CK IF OPS Should Be Placed In  | <del>(2-,0-131-1310-</del> |     |   |      |
|              |       | RCS temperature - LESS THAN<br>LIMITS OF TECHNICAL<br>SPECIFICATION FIGURE 3.1.A-1<br>PORV OPEN PRESSURE   |                            | a.  | <u>IF</u> RCS pressure less than 2335 psig. VERIFY PORVs CLOSED                       | пппп |
|              |       | VERIFY OPS armed light -<br>ILLUMINATED  |                            | b.  | GO TO Step 24.  |      |
|              |       | CHECK RCS pressure - AT LEAS<br>25 PSIG BELOW CALCULATED OPS<br>PRESSURE (Panel SF)  | Γ                          | c.  | PERFORM the following:  1) ENSURE both PORVs - OPEN                                   | ппп  |
|              |       | PRESSURE (Pallet SF)   |                            |     | 2) WHEN RCS pressure less than setpoint. GO TO Step 23d                               |      |
|              | d.    | VERIFY both PORVs - CLOSED   |                            | d.  | <u>IF</u> either PORV will NOT <u>clos</u> e.<br>CLOSE associated PORV block<br>valve |      |
| 24.          |       | FORM sampling of RCS. SGs AND tainment   |                            |     |   |      |
|              | a.    | OBTAIN the following samples   | :                          |     |   |      |
|              |       | o RCS boron concentration<br>o RCS activity<br>o Containment Atmosphere<br>(H <sub>2</sub> /O <sub>2</sub> )<br>o Containment Sump boron<br>concentration<br>o Activity of all Steam<br>Generators |                            |     | ·   |      |
|              |       |  |                            |     |   | l    |

25. <u>ISOLATE SI Accumulators</u>

- a. CHECK SI Accumulators UNISOLATED
- b. ENERGIZE the following breakers:
  - o MOV-894A
  - o MOV-894B
  - o MOV-894C
  - o MOV-894D

a. GO TO Step 26.

Title: Number: Revision Number: LOCA WHEN RCS TEMPERATURE AT LEAST 200 of AND LESS AOI 4.2.2 REV. 6 THAN 350 °F **STEP** ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED c.  $\underline{\text{IF}}$  unable to isolate an SI c. CLOSE SI Accumulator Outlet Accumulator, VENT the affect Stops: accumulator as follows: o MOV-894A 1) VERIFY PCV-863, Accumulator o MOV-894B o MOV-894C N2 Supply Line Stop - CLOSED o MOV-894D a) IF unable to close PCV-863. CLOSE the following valves: o 1809. Accumulator N<sub>2</sub> Truck Fill Stop o 1811A. Accumulator N2 Supply Root Stop (North Bank) o 1811B. Accumulator N2 Supply Root Stop (South Bank) b) OPEN gas stop for affected accumulator: o 891A. 21 Accumulator Gas Stop o 891B. 22 Accumulator Gas Stop o 891C, 23 Accumulator Gas Stop o 891D, 24 Accumulator Gas Stop c) OPEN HCV-943 Accumulators N2 Vent Controller to 100 percent d. DE-ENERGIZE the following breakers o MOV-894A o MOV-894B o MOV-894C o MOV-894D

Title: Revision Number: Number: LOCA WHEN RCS TEMPERATURE AT LEAST 200 of AND LESS AOI 4.2.2 REV. 6 THAN 350 °F **STEP** ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED CAUTION  ${\underline{\it IF}}$  no Charging Pumps are running, starting a Charging Pump with the RWST level less than 15 feet may result in air-binding of the pump. 26. CHECK IF Charging flow is adequate: a. PERFORM the following: a. VERIFY at least one Charging Pump - RUNNING 1) <u>IF</u> CCW flow to RCP thermal barrier is lost, ISOLATE seal injection to affected RCP BEFORE starting charging pumps by either of the following: o Locally CLOSE seal injection needle valves: o 241B o 241C o 241D

- OR -

- o ENERGIZE AND CLOSE seal injection isolation valves:
  - o MOV-250A MCC 26AA o MOV-250B - MCC 26BB o MOV-250C - MCC 26AA o MOV-250D - MCC 26BB
- START one Charging Pump
- b. VERIFY Pressurizer Level -GREATER THAN 28% [47% FOR

ADVERSE CONTAINMENT]

- b. PERFORM the following:
  - PLACE all PRZR heater switches in OFF
  - 2) OPEN LCV-112B, Charging Pump Suction From RWST
  - 3) OPEN LCV-112C, Charging Pump Suction Fron VCT
  - 4) START additional Charging Pumps
  - 5) ADJUST Charging Pump speed controllers for maximum flow

|       | Number:     |                         | Title:  |  |                              |                                       | · · · · · ·  |   | Revision Number:             |
|-------|-------------|-------------------------|---|--|------------------------------|---------------------------------------|--|---|------------------------------|
| . • • | AOI 4.2.    | .2                      | LOCA WHEN   | RCS TEMPERATI                            | URE AT LEAST<br>THAN 350     |                                       | °F AND LE  | ESS   | REV. 6                       |
| •     | F           |                         |   |  |                              |                                       |  |   |                              |
| ſ     | STEP        |                         | CTION/EXPECTED R  | ESPONSE                                  |                              | RESPONSE                              | NOT OBTAIN   | ED  |                              |
| ষষষ   |             |                         | রুম্বর্মম্বর্ম<br>রুম্বর্মম্বর্মম্বর্                     |  |                              | r r r r r r r r r r r r r r r r r r r | aaaaaa   | adada   | ) අතුත්ත්ත්ත්ත්ත<br><i>ම</i> |
|       | 0<br>0<br>0 | RCS-4                   | own margin should<br>for minimum shut                     | tdown boron c                            | d during RCS<br>oncentration |                                       |  | ·   | 0<br>0<br>0                  |
| ଷଷଷ   |             |                         | <br>  |  |                              | ldddd                                 | adddda   | hadak   | අ <b>ත්ත්ත්ත්ත්ත්</b>        |
|       | 27.         |                         | TIATE RCS Cooldo<br>tdown:                                | wn To Cold                               | <del></del>                  |                                       |  |   |                              |
|       |             | a.                      | MAINTAIN cooldow<br>cold legs - LESS                      |  | -                            |                                       |  |   |                              |
|       |             | b.                      | OPERATE Condense  | er steam dump                            | s t                          |                                       | ndenser steam<br>uble, OPERATI<br>dumps  |   |                              |
|       |             |                         |   |  |                              | av<br>is<br>atı<br>RE                 | _controllers<br>ailable OR <u>I</u><br>N <u>OT</u> availab<br>mospheric st<br>FER TO AOI 2<br>cal operatio | instrument<br>le to<br>leam dumps<br>27.1.9 for | Air                          |
|       | 28.         | Cor                     | CK RCS Subcoolin<br>e Exit TCs - GRE<br>UE OBTAINED IN T  | ATER THAN                                |                              | io to Step                            | o 35.  |   |                              |
|       | n<br>H      | WR RCS                  |   | S SUBCOOLING<br>ERSE CONTAINM            | °F ¤<br>ENT)¤                |                                       |  |   |                              |
|       | n<br>n<br>n | 0<br>401<br>801<br>1201 | ь ፝   | 52 (83)<br>36 (49)<br>23 (30)<br>19 (26) | и<br>и<br>и                  |                                       |  |   |                              |
|       | 29.         | <u>CHE</u>              | CK IF SI Is In S  | ervice:                                  | G                            | o to Step                             | 35.  |   |                              |
| j     |             | 0 5                     | SI pumps - ANY RU   | JNNING                                   |                              |                                       |  |   |                              |
|       |             |                         | - OR -<br>RHR pumps - ANY<br><del>RUNNING WITH SUCT</del> |  | -                            |                                       |  |   |                              |

Title:

**STEP** ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED 30. PLACE All PRZR Heater Switches In OFF\_Position CAUTION o Voiding may occur in the RCS during the depressurization. This will result in a rapidly increasing Pressurizer level. o IF RCS pressure decreases to less than 300 psig during the following depressurization, any running RCPs shalll be secured. DEPRESSURIZE RCS To Refill PRZR: 31. a. OPERATE normal PRZR spray a. PERFORM the following: 1) OPERATE one PRZR PORV 2) IF no PORV available. PERFORM the following to use auxiliary spray: a) MAINTAIN RCP seal injection 6 to 10 gpm b) Verify at least one charging pump running. c) REDUCE charging pump speed to minimum flow d) CLOSE HCV-142. Charging Line Flow Control Valve e) CLOSE charging line stops: o 204B, Loop 21 Cold Leg Norm o 204A. Loop 22 Hot Leg Alt This Step continued on the next page.

**STEP** ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED f) CLOSE PRZR Spray valves: o PCV-455A o PCV-455B g) OPEN 212, Auxiliary Spray Valve h) INITIATE Auxiliary Spray slowly using HCV-142 i) ADJUST charging pump speed to control the depressurization b. CHECK PRZR level - GREATER b. Continue with Step 32 AND THAN 28% [47% FOR ADVERSE WHEN PRZR level greater than CONTAINMENT] 28% [47% for adverse containment]. PERFORM Step 31c. c. STOP RCS depressurization

| Number:    | Title:   | <del></del>                   |                         | Revision Number:          |
|------------|--|-------------------------------|-------------------------|---------------------------|
| A0I 4.2.2  | LOCA WHEN RCS TEMPERATUR   | E AT LEAST 200<br>THAN 350 °F | °F AND LESS             | REV. 6                    |
| CTED       | ACTION (EXPECTED DECRONES  | DECDON                        | SE NOT OBTAINED -       |                           |
| STEP       | ACTION/EXPECTED RESPONSE   | RESPONS                       | SE NOT OBTAINED         |                           |
| * * *      | * * * * * * * * * * * * *  | * * * * * * * *               | * * * * * * * *         | * * * * * * *             |
| *          |  | CAUTION                       |                         | *                         |
| * 0        | IF voids were created in the head<br>rapid drop in Pressurizer level AN<br>collapsing of the voids following | ND pr <u>essu</u> re may oc   |                         | *                         |
| *          | AN RCP shall NOT <u>be</u> started in a leak.  | loop that has an i            | dentifed SG tube        | *                         |
| * 0        | <u>IF</u> RCP seal cooling had been previ<br><u>NOT</u> be started PRI <u>OR</u> to a status e               |                               | ffected RCP(s) shall    | * *                       |
| * * * *    | . * * * * * * * * * * * *  | * * * * * * *                 | * * * * * * * * *       | * * * * * * *             |
| Æ Ø Ø      | -<br>ব্যুত্ত বিষ্ণু ব্যুত্ত বিষ্ণু ব্যুত্ত বি  |                               | ***********             | XXXXXXXXXX                |
|            | ।<br>यथ्यय्ययय्ययय्ययय्ययय्यय्यय्य   | 880                           |                         |                           |
| 0          |  | <u>NOTE</u>                   |                         | <b>0</b>                  |
| <b>©</b> 0 | RCPs should be run in the following  | ng order to provide           | e normal PRZR spray:    | 0                         |
| 0 0        | 24 RCP (PCV-455A)  |                               |                         | <b>0</b>                  |
| 000        | 23 RCP (PCV-455B)  |                               |                         | <b>0</b>                  |
| © O        |  |                               |                         | <b>©</b>                  |
|            | ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼<br>ਸ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼ਖ਼                                   |                               | අතුත්ත්ත්ත්ත්ත්ත්ත්<br> | । ব্যব্যব্যব্যব্যব্য<br>১ |
| 32.        | CHECK IF An RCP Should Be<br>Started:  |                               |                         |                           |
|            | a. All RCPs - STOPPED  | a. PERFO                      | ORM the following:      |                           |
|            |  | 1) S                          | TOP all but one RCP     |                           |
| ı          |  | 2) G                          | 0 TO Step 33            | ·                         |
|            |  |                               |                         |                           |
|            |  |                               |                         |                           |
|            |  |                               |                         |                           |
|            |  |                               |                         |                           |
|            |  |                               |                         |                           |
|            |  |                               |                         |                           |
|            |  |                               |                         | •                         |

Title: Number: Revision Number: LOCA WHEN RCS TEMPERATURE AT LEAST 200 F AND LESS AOI 4.2.2 REV. 6 THAN 350 °F STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED b. RCS subcooling based on b. GO TO Step 42. core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE BELOW #WR RCS PRESSURE # RCS SUBCOOLING OF # # (ADVERSE CONTAINMENT)# (PSIG) 0 - 400 ¤ 52 (83) Ħ 401 - 800 ¤ 36 (49) 
 H
 801 - 1200
 H
 23 (30)

 H
 1201 - 2500
 H
 19 (26)
 Ħ c. PRZR level - GREATER THAN c. RETURN TO Step 31. 28% [47% FOR ADVERSE CONTAINMENT] d. CHECK MCC 28 AND MCC 28A - d. PERFORM the following: **ENERGIZED** 1) <u>IF</u> Containment Sump level less than 44'3" AND Containment conditions NOT \_\_ adverse. RESET MCC 28 AND \_\_\_ MCC 28A 2) IF MCC 28 can NOT be reset. GO TO Step 33 e. CHECK Containment Sump level - e. TRIP MCC 28 AND MCC 28A LESS THAN 44'3" f. START an RCP per SOP 1.3. Reactor Coolant Pump Startup And Shutdown CHECK RCS Cold Leg Temperature - GO TO Step 35. 33. GREATER THAN 295°F

| AOI 4.2  | 2.2  | LC   | ICA WHE  | n RCS   | TEMPERAT  | TURE AT L  | _EAST 20(<br>350  °F   | )  | °F AI   | ND LES   | S   |   | REV.  | 6                    |
|--|--|--|--|---|---|--|--|--|---|--|---|---|---|----------------------|
|  |  |  |  |   |   | I TIMIN C  | ) T  |  |   |  |   |   |   |                      |
|  |  |  |  |   |   |  |  |  |   |  |   |   |   |                      |
| STEP   | A(   | CTION/EX   | PECTED   | RESPO   | NSE   | }  | RE   | PONSE  | NOT OB  | TAINED   | }   |   |   |                      |
|  | - J - L  |  |  |   | <del></del>   |  |  |  |   |  |   |   |   |                      |
|  |  |  |  |   |   | s a a a a  | a da da da   | ষ্বস্বস্থ  | BBB   | aaa  | BBB   | RR  | kkkk  | a a a                |
| রুম্বম্বয়<br>৩  |  | <b>য়েমুমুমু</b>   | য়মুম্ব <u>ত্</u>  | য়ম্বমুহ  | ষ্ব্ৰষ্   |  | NOTE_  |  |   |  |   |   |   | O                    |
| 0  |  |  |  |   |   | 17   | IOIL_  |  |   |  |   |   |   | 0                    |
| O  | PRIOR  |  |  |   |   | ransition  |  |  |   |  |   |   |   | 0                    |
|  |  |  |  |   |   | the mini   | imum OR a  | furt <u>h</u>  | <u>er</u> inc   | rease  | with  |   |   | 0                    |
| ග<br>ල   | one le   | ess pump   | runnin   | g shou  | ild be of   | oserved.   |  |  |   |  |   |   |   | (O                   |
| •  |  | 88888  | 8888   | 888   | 88888   | s a a a a  | 38888  | 8888   | 888   | 888  | r<br>R<br>R<br>R  | 888   | 8888  | _                    |
| RARAR  |  |  |  |   |   |  |  | • • •  |   |  |   |   |   | • • •                |
| 24   | CUE  | רע זר כז   | Dumo C   | اماليمط   | Do.   |  |  |  |   |  |   |   |   |                      |
| 34.  |  | CK IF SI<br>pped:  | Pump 3   | <u>silou iu</u>   | _DE   | •  |  |  | ٠   |  |   |   |   |                      |
|  | <u> </u>   | <del></del>  |  |   |   |  |  |  |   |  |   |   |   |                      |
|  |  | Any SI p   | oump -   |   |   |  | a. (   | O TO S   | tep 35  |  |   |   |   |                      |
|  |  | RUNNING  |  |   |   |  |  |  |   |  |   |   |   |                      |
|  |  |  |  |   |   |  |  |  |   |  |   | •   |   |                      |
|  | b.   | DETERMIN   | IE reau  | iired R   | RCS   |  |  |  |   |  |   |   |   |                      |
|  |  | DETERMIN<br>subcooli   |  |   |   |  |  |  |   |  |   |   |   |                      |
| .∠H  |  | subcooli   | ng fro   | m tabl  | e:  | . н. и. н. и.  | м. н. н. н. н  | . н. н. н. у   | t. H. H. H.   | . н. н. н.   | M. M. H. I  | н. н. н.  | <b>м. н. н. н</b> .                                 |                      |
|  | <i>ጐ፞፞፞፞፞፞፞፞፞፞፞፞፞</i> ፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟   | subcooli<br>የቃውቃው  | ng fro<br>ьቴውቴ   | m tabl<br>፞፞፞፞፞፞፞፞፞፞፞፞፞፞፞፞፞፟፟፟  | e:  | <i>&gt;&amp;&amp;&amp;&amp;</i>  | <i><b><b>¢¢¢¢</b></b></i>  | <i>፞፞፞፞፞፞ዾ</i> ቑዿ  | <i>ዮ<b>ଜ</b>ଜ</i>   | <i>ጐ፞፞፞፞ቚ</i> ፞፞   | <i>\$\$\$</i>   | <i>ቀ</i> ଜ  | <i><b><b>&amp;</b></b></i> <b>&amp; &amp; &amp;</b> | <i>ቁቁቁ</i>           |
|  | <i>ጐ፞፞፞፞፞፞፞፞፞፞፞፞፞</i> ፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟   | subcooli<br>የቃውቃው  | ng fro<br>ኔዔውቴ<br>፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟   | m tabl<br>፞፞፞፞፞፞፞ጜ፞ጜ<br>ጋ   | e:  | ቃ <b>ቴቴቴ</b> ቴ   |  |  |   | › <i>፞</i> ፞፞፞፞፞፞፞፞፞፞፞፞፞፞  |   | н<br><i>ффф</i>   | <i><b><b>&amp;</b></b></i>                          | <i>ቁ ቁ ቁ</i>         |
| ,<br>#<br>#  | SI   | subcooli<br>.፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟  | ng fro<br>\$ቴውቴ<br>ቴቴቴሮ<br>RC  | m tabl<br>፞፞፞፞፞፞፞፞፞፞፞፞፞፞፞፞፞፞፞፞፞፞፞፟፟፟<br>S SUBC  | e:<br>ጜጜጜጜ<br>OOLING (  | °F) (Adv   | erse Cor   | tainmer  | nt)   |  |   | ц   |   |                      |
| #<br>#<br>#  | SI   | subcooli<br>.፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟  | ng fro<br>\$ቴውቴ<br>ቴቴቴሮ<br>RC  | m tabl<br>፞፞፞፞፞፞፞፞፞፞፞፞፞፞፞፞፞፞፞፞፞፞፞፟፟፟<br>S SUBC  | e:<br>ጜጜጜጜ<br>OOLING (  | °F) (Adv   | erse Cor   | tainmer  | nt)   |  |   | ц   |   |                      |
| #<br>#<br>#  | \$\$\$\$\$<br>\$I<br>\$\$\$\$\$\$  | subcool i<br>\$\$\$\$<br>\$\$\$\$<br>¤<br>\$\$\$\$   | ng fro<br>ኤኤኤቴ<br>ኤኤኤቴ<br>RC<br>ኤኤኤቴ   | m tabl<br>ኤቴቴ፡<br>)<br>S SUBC<br>›ቴቴቴ   | e:<br>ቴቴቴቴቴ   | °F) (Adv<br>፟፟፟፟፟፟፟፟፟፟፟ የ  | verse Cor<br>ዕ <b>ኤኤኤኤ</b>   | tainmer<br>ቃ፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟   | nt)<br>ጜጜጜ  | <i>ኑ<b></b>፞</i> ፞፞፞፞፞፞፞   | ৽ <mark></mark> ৢ৽  | <i>ଜଜ</i> ଜ   |   |                      |
| т<br>т<br>р <i>фффф</i><br>г   | SI   | subcool i<br>\$\$\$\$<br>\$\$\$\$<br>¤<br>\$\$\$\$   | ng fro<br>ኤኤኤቴ<br>ኤኤኤቴ<br>RC<br>ኤኤኤቴ   | m tabl<br>ኤቴቴ፡<br>)<br>S SUBC<br>›ቴቴቴ   | e:<br>ቴቴቴቴቴ   | °F) (Adv   | verse Cor<br>ዕ <b>ኤኤኤኤ</b>   | tainmer<br>ቃ፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟   | nt)<br>ጜጜጜ  | <i>ኑ<b></b>፞</i> ፞፞፞፞፞፞፞   | ৽ <mark></mark> ৢ৽  | <i>ଜଜ</i> ଜ   |   |                      |
| т<br>п<br>п<br>п<br>п<br>п<br>п<br>п<br>п<br>п<br>п<br>п<br>п<br>п<br>п<br>п<br>п<br>п<br>п<br>п   | \$\$\$\$\$<br>\$\$\$\$\$<br>\$I<br>\$\$\$\$\$<br>PUMP<br>I/S   | subcooli<br>የ፟፞፞፞፞፞፞፞፞፞፞፞<br>የ<br>ያ<br>ያ<br>ያ<br>ያ<br>ያ<br>ያ<br>ያ<br>ያ<br>ያ<br>ያ<br>ያ<br>ያ<br>ያ  | ng fro<br>ቃቄውቄ<br>RC:<br>ቴቴቴቴ  | m tabl  | e:<br>ኤኤኤኤዩ<br>OOLING (<br>ኤኤኤኤ <sup>ኒ</sup><br>፲ 2 CHG   | °F) (Adv<br>ቴቴቴቴሮ<br>Pumps   | verse Cor<br>ንቴቴቴቴ<br>¤ 1 CH   | tainmer<br>ኤኤኤኤ<br>G Pumps   | nt)<br>\$\$\$\$   | ቃ <b>፞፞፞፞፞፞</b> ፝፝፞፞፞፞፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟   | ∙ው፝፞፞፞፝፝፝፞፝፝፝፝፟፟፟፟<br>Pumps   | ,<br><i>ффф</i>   | <i>\$\$\$\$</i>                                     | <i><b>,¢</b>¢¢</i>   |
| **************************************   | \$\$\$\$\$<br>\$\$\$\$\$<br>\$I<br>\$\$\$\$\$<br>PUMP<br>I/S   | subcooli<br>subcooli<br>sububub<br>r<br>subububu<br>r<br>3   | ng fro<br>ኤኤኤዴ<br>RC<br>ኤኤኤዴ<br>CHG Pu   | m tabl<br>www.<br>S SUBC<br>> \$\$\$<br>mps **  | e:<br>፟፟<br>OOLING (<br>፟<br>፟<br>ሁ፝<br>ሁ፝<br>ይ<br>U<br>ሁ<br>ሁ<br>ሁ<br>ሁ<br>ሁ<br>ሁ<br>ሁ<br>ሁ<br>ሁ<br>ሁ<br>ሁ<br>ሁ<br>የ<br>የ<br>የ<br>የ<br>የ<br>የ<br>የ   | °F) (Adv<br>ቴቴቴቴሮ<br>Pumps<br>ቴቴቴቴ   | verse Cor<br>ጋኤኤኤኤ<br>¤ 1 CH<br>ኤኤኤኤኤ  | tainmer<br>ቃዔዔዔ<br>G Pumps<br>ቃዔዔው   | nt)<br>ቴቴቴቴ<br>¤<br>ቴቴቴቴ  | ቃጭቴ<br>No CHG<br>ቃጭቴ   | ውሁቴ<br>Pumps<br>ትጭቴ   | <i>*</i>  | ৽ড়ড়ড় <mark>ড়</mark><br>৽ড়ড় <b></b> ঢ়ড়       | <i>\$\$\$</i>        |
| т<br>п<br>п<br>п<br>п<br>п<br>п<br>п<br>п<br>п<br>п<br>п<br>п<br>п<br>п<br>п<br>п<br>п<br>п<br>п   | \$\$\$\$\$<br>\$\$\$\$\$<br>\$I<br>\$\$\$\$\$<br>PUMP<br>I/S   | subcooli<br>subsubsubsubsubsubsubsubsubsubsubsubsubs   | ng fro<br>ኤቴቴዊ<br>RC:<br>ቴቴቴዊ<br>CHG Pu<br>ቴቴቴዊ  | m tabl<br>www.<br>S SUBC<br>> \$\$\$<br>mps =<br>> \$\$\$<br>No   | e:<br>፝፞፞፝፝፝፝፟፟፟፟፟፟፟፟፟፟፟<br>OOLING (<br>፝፞፞፞፞፞፞፞፞፞፞፞፞፞<br>፟፟፟፟፟፟፟፟፟፟፟   | °F) (Adv<br>ቴቴቴቴሮ<br>Pumps<br>ቴቴቴቴኖ<br>¤ No  | verse Cor<br>ጋቴቴቴቴ<br>¤ 1 CH<br>ካቴቴቴቴ  | tainmer<br>らもちち<br>G Pumps<br>らちちの   | nt)  \$\text{\$\ext{\$\text{\$}\exititt{\$\text{\$\text{\$\texi{\$\text{\$\texi{\$\texit{\$\text{\$\texititt{\$\text{\$\text{\$\texit{\$\texit{\$\text{\$\texit{\$\texi{\$\tex{\$\texititit{\$\texititt{\$\texitt{\$\texitt{\$\texit{\$\texit{\$\texi}  | \$፝፞፞፞፝፝፝፝፝፝፝፟፟፟\$<br>No CHG<br>\$፟፟፟፟፟፟\$<br>\$ <b>n</b> y  | ውው\$<br>Pumps<br>ትቴቴ  | п<br>ффф  | ¤<br>***  | <i>\$\$\$</i>        |
| , , , , , , , , , , , , , , , , , , ,  | \$\$\$\$\$<br>\$\$\$\$\$<br>\$I<br>\$\$\$\$\$<br>PUMP<br>I/S   | subcooli<br>\$\$\$\$\$<br>#<br>\$\$\$\$<br># 3<br>\$\$\$\$<br># An   | ng fro<br>\$ ቴቴው<br>RC<br>\$ ቴቴ ቴ<br>CHG Pu<br>ቴቴቴ ቴ   | m tabl<br>\$\$\$\$<br>S SUBC<br>\$\$\$\$<br>mps =<br>\$\$\$\$<br>No<br>RCPs   | e:<br>፝፞፞፝፝፝፝፟<br>OOLING (<br>፝፞፞፞፞፞፞፞፞፞፞፞፞<br>ጜ 2 CHG<br>ው፟፟፟<br>ው፟፟፟፟፟፟፟፟፟፟፟<br>መ፟ጜጜጜ<br>T Any<br>I RCPs  | °F) (Adv<br>ቴቴቴቴሮ<br>Pumps<br>ቴቴቴቴ<br>¤ No<br>¤ RCPs   | verse Cor<br>ጋ፝፞፞፞፞፞፞፞፞፝፞፞፞፞፞፞፟፟   | tainmer<br>らちちち<br>G Pumps<br>らちちの<br>ロ RC   | nt)  \$\square\$\square\$\square\$  \$\square\$\square\$  \$\square\$\square\$  \$\square\$  \$\squar   | \$፝፞፞፞፝፝፝፝፝፝፝፝፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟   | Pumps<br>ትቁ፞፞፞፞፞፞፞፞፞፞፞<br>ቋ N   | и<br><b>\$\$</b><br><b>\$</b><br><b>\$</b>                    | ৽ড়ড়ড় <mark>ড়</mark><br>৽ড়ড় <b></b> ঢ়ড়       | <i>\$\$\$</i>        |
| м<br>м<br>м<br>м<br>м<br>м<br>м<br>м<br>м<br>м<br>м<br>м<br>м<br>м   | \$ <b>\$\$\$</b><br>\$I<br>\$ <b>\$</b> \$\$\$<br>PUMP<br>I/S<br>O <b>\$</b> \$\$\$  | Subcooli<br>SUBCOOli<br>SUBSUB<br>H<br>SUBSUB<br>H<br>ACP<br>H<br>CON  | ng fro  \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$   | m tabl  | e:<br>፝፞፞፝፝፝፝፟፟፟፟፟፟<br>OOLING (<br>፝፞፞፞፞፞፞፞፞፞፞፞፞፞፟፟፟፟፟<br>ዄ፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟   | °F) (Adv<br>\$\$\$\$<br>Pumps<br>\$\$\$\$<br>¤ No<br>¤ RCPs<br>¤ ON  | rerse Cor<br>ኦቴቴቴቴ<br>¤ 1 CH<br>ኔቴቴቴቴ<br>¤ Any<br>¤ RCPs<br>¤ ON   | tainmer<br>s も も も<br>G Pumps<br>s も も ①<br>ロ RC<br>ロ RC   | nt)  \$\sigma \sigma \si   | \$ ፝\$ ፝\$ ፝\$<br>No CHG<br>\$ ፝\$ ፝\$ ፝\$<br>Any<br>RCPs<br>ON  | Pumps AUU RC RC RC  | т   | »\$\$\$<br>п<br>п<br>п                              | <i>,</i> \$\$\$      |
| фффф,<br>ффффф,<br>ффффф,<br>фффффф,<br>фффффффф   | \$\$\$\$\$<br>SI<br>\$\$\$\$<br>PUMP<br>I/S<br>O\$\$\$\$   | Subcooli<br>Subcooli<br>Subsubsubsubsubsubsubsubsubsubsubsubsubsu  | ng fro  by  RC  CHG Pu  y x x x  y x x x  by   | m tabl<br>www.i<br>S SUBC<br>> \$ \$ \$ \$ \$<br>mps  | e:<br>፝፞፞፝፝፝፝፟፟፟፟፟፟<br>OOLING (<br>፝፞፞፞፞፞፞፞፞፞፞፞፞፞፟፟፟፟፟<br>ዄ፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟   | °F) (Adv<br>ቴቴቴቴሮ<br>Pumps<br>ቴቴቴቴ<br>¤ No<br>¤ RCPs   | rerse Cor<br>ኦቴቴቴቴ<br>¤ 1 CH<br>ኔቴቴቴቴ<br>¤ Any<br>¤ RCPs<br>¤ ON   | tainmer<br>s ちちち<br>G Pumps<br>s ちちつ<br>ロ RC<br>ロ C  | nt)  \$\sigma \sigma \si   | \$ ፝\$ ፝\$ ፝\$<br>No CHG<br>\$ ፝\$ ፝\$ ፝\$<br>Any<br>RCPs<br>ON  | Pumps AUU RC RC RC  | т   | »\$\$\$<br>п<br>п<br>п                              | <i>,</i> \$\$\$      |
| Popularian services of the ser | \$\$\$\$\$<br>SI<br>\$\$\$\$<br>PUMP<br>I/S<br>O\$\$\$\$   | Subcooli<br>Subcooli<br>Subsubsubsubsubsubsubsubsubsubsubsubsubsu  | ng fro  by  RC  CHG Pu  y x x x  y x x x  by   | m tabl<br>www.<br>S SUBC<br>> \$ \$ \$ \$ \$<br>mps   | e:<br>፝፞፞፝፝፝፝፟፟፟፟፟፟<br>OOLING (<br>፝፞፞፞፞፞፞፞፞፞፞፞፞፞፟፟፟፟፟<br>ዄ፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟   | °F) (Adv<br>\$\$\$\$<br>Pumps<br>\$\$\$\$<br>¤ No<br>¤ RCPs<br>¤ ON  | rerse Cor<br>ኦቴቴቴቴ<br>¤ 1 CH<br>ኔቴቴቴቴ<br>¤ Any<br>¤ RCPs<br>¤ ON   | tainmer<br>s ちちち<br>G Pumps<br>s ちちつ<br>ロ RC<br>ロ C  | nt)  \$\sigma \sigma \si   | \$ ፝ \$ ፟<br>No CHG<br>\$ ፟<br>\$ \$ \$<br>Any<br>RCPs<br>ON<br>\$ \$ \$<br>\$   | Pumps AUU RC RC RC  | т   | »\$\$\$<br>п<br>п<br>п                              | <i>`&amp;&amp;</i>   |
| A CALLE CALL | \$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\  | Subcooling  | ng fro  by  CHG Pul  THE POST  | m tabl<br>www.<br>S SUBC<br>> \$ \$ \$ \$<br>mps  | e:<br>ኤኤኤኤ<br>OOLING (<br>ኤኤኤኤ<br>፣ 2 CHG<br>①ኤኤኤ<br>¤ Any<br>¤ RCPs<br>¤ ON<br>ኤኤኤኤ  | °F) (Adv<br>\$\$\$\$C<br>Pumps<br>\$\$\$\$\$<br>¤ No<br>¤ RCPs<br>¤ ON<br>\$\$\$\$\$   | rerse Cor<br>中 1 CH<br>中 Any<br>中 Any<br>中 RCPs<br>中 ON<br>安安安明  | tainmer<br>\$\$\$\$<br>G Pumps<br>\$\$\$\$<br># RO<br># RO<br># C  | t)  \$\$\text{\$\exitt{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\exitt{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\exitt{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\exittit{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\exittitt{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\tex{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\exittit{\$\text{\$\text{\$\text{\$\tex{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$   | \$ ፝\$ ፝\$<br>No CHG<br>\$ \$ \$ \$ \$<br>Any<br>RCPs<br>ON<br>\$ \$ \$ \$   | Pumps A B A RO A B B B B B B B B B B B B B B B B B B B  | ロ<br>サ<br>サ<br>サ<br>UO<br>PS<br>IN<br>サ<br>サ                  | ч<br>ч<br>ч<br>ч<br>ч<br>ч<br>ч<br>ч<br>ч<br>ч      | <i>`&amp;&amp;</i>   |
| т<br>т<br>т<br>т<br>т<br>т<br>т<br>т<br>т<br>т<br>т<br>т<br>т<br>т   | SI<br>SI<br>SUMP<br>I/S<br>OUND<br>OUND<br>SUND<br>SUMP<br>FUMPS   | Subcooli   | ng fro  by  CHG Pu  CHG Pu  S9)  59)  59)  | m tabl<br>www.<br>S SUBC<br>s www.<br>mps r<br>s www.<br>No<br>RCPs<br>ON<br>Www.<br>6 (76)   | e:  \$\\$\\$\\$\\$\\$\\$\\$  OOLING (  \$\\$\\$\\$\\$\\$\\$\\$  1 2 CHG  O\\$\\$\\$\\$\\$\\$\\$  Any  # RCPs  # RCPs  # ON  \$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$  ## 148 (60  | °F) (Adv<br>ち歩歩むで<br>Pumps<br>歩歩歩令<br>エ No<br>エ RCPs<br>エ ON<br>歩歩歩歩   | rerse Cor<br>中 1 CH<br>中 Any<br>中 RCPs<br>中 ON<br>歩歩会歩せ  | tainmer<br>\$\$\$\$<br>\$Pumps<br>\$\$\$\$<br># RO<br># RO<br># \$\$<br># \$\$<br># \$0  | t)  \$\text{\$\exititt{\$\text{\$\text{\$\text{\$\texi\\$\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\texi\}\$}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}   | \$ ፟\$ ፟\$ \$<br>No CHG<br>\$ \$ \$ \$<br>Any<br>RCPs<br>ON<br>\$ \$ \$<br>49 (61  | Pumps AUU RC RC RC RC RC RC RC RC RC RC RC RC RC  | и<br>\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ | »\$\$\$<br>п<br>п<br>п<br>ф<br>\$\$\$<br>п          | ,\$\$\$              |
| ф<br>ф<br>ф<br>ф<br>ф<br>ф<br>ф<br>ф<br>ф<br>ф<br>ф<br>ф<br>ф<br>ф   | SI<br>SI<br>SUMP<br>I/S<br>OUNP<br>OUNP<br>OUNP<br>SI<br>Pumps<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP<br>SUMP | Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcooli<br>Subcoo | ING From the second sec   | m tabl  s subc  | e:  \$\\$\\$\\$\\$\\$\\$\\$  OOLING (  \$\\$\\$\\$\\$\\$\\$\\$  1 2 CHG  O\\$\\$\\$\\$\\$\\$\\$  Any  # RCPs  # RCPs  # ON  \$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$  ## 148 (60  | °F) (Adv<br>\$\$\$\$C<br>Pumps<br>\$\$\$\$<br>¤ No<br>¤ RCPs<br>¤ ON<br>\$\$\$\$\$<br>¤ ON   | rerse Cor<br>中 1 CH<br>中 Any<br>中 RCPs<br>中 ON<br>歩歩会歩せ  | tainmer<br>\$\$\$\$<br>\$Pumps<br>\$\$\$\$<br># RO<br># RO<br># \$\$<br># \$\$<br># \$0  | t)  \$\text{\$\exititt{\$\text{\$\text{\$\text{\$\texi\\$\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\texi\}\$}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}   | \$ ፟\$ ፟\$ \$<br>No CHG<br>\$ \$ \$ \$<br>Any<br>RCPs<br>ON<br>\$ \$ \$<br>49 (61  | Pumps AUU RC RC RC RC RC RC RC RC RC RC RC RC RC  | и<br>\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ | »\$\$\$<br>п<br>п<br>п<br>ф<br>\$\$\$<br>п          | ,\$\$\$              |
| ффффффффффффффффффффффффффффффффффффф  | \$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\  | Subcooling  | ng fro \$\$\text{\$\exititt{\$\text{\$\exititt{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\ | m tabl<br>www.<br>S SUBC<br>S SUBC<br>S SUBC<br>NO<br>RCPS<br>ON<br>S SUBC<br>S | e:  \$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$  | Pumps Pumps No RCPs RCPs Pumps | rerse Cor<br>p \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$  | tainmer<br>s \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$  | by the second of  | NO CHG<br>SUBSECTION<br>Any<br>RCPS<br>ON<br>SUBSECTION<br>AP (61<br>SUBSECTION<br>72  | Pumps A B RR ( B B B B B B B B B B B B B B B B B B B  | ロ   | , ф ф ф ф ф ф ф ф ф ф                               | \$\$\$\$             |
|  | SI SE SE SE SE SE SE SE SE SE SE SE SE SE  | Subcooling  | ng fro Фес Ф Ри Ф ппнффп 66Ф Ф Ри Ф ппнффп 66Ф Ф 100   | m tabl  www. S SUBC  S SUBC  No RCPs ON  C (76)  92 (99)  | e:  \$\\$\\$\\$\\$\\$\\$\\$  00LING ()  \$\\$\\$\\$\\$\\$\\$\\$\\$  1 2 CHG  1 2 CHG  1 Any  1 RCPs  1 RCPs  1 RCPs  1 48 (60  1 48 \$\\$\\$\\$  1 48 \$\\$\\$\\$  1 48 \$\\$\\$\\$  1 48 \$\\$\\$\\$  1 48 \$\\$\\$\\$\\$\\$  1 48 \$\\$\\$\\$\\$\\$\\$\\$  1 48 \$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\   | Pumps  | rerse Cor<br>PUBLISHED CON<br>PUBLISHED  | tainmer<br>\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$  | nt)  \$\frac{1}{2} \times \frac{1}{2} \times 1   | \$ \$ \$ \$ \$<br>No CHG<br>\$ \$ \$ \$ \$<br>RCPs<br>ON<br>\$ \$ \$ \$<br>49 (61<br>\$ \$ \$ \$<br>(83)   | Pumps Pumps A H R R () B H A B  | ロ   | и ф ф ф ф ф ф ф ф ф ф ф ф ф ф ф ф ф ф ф             | \$\$\$\$<br>\$\$\$\$ |
|  | SI SE SE SE SE SE SE SE SE SE SE SE SE SE  | Subcooling  | ng fro Фес Ф Ри Ф ппнффп 66Ф Ф Ри Ф ппнффп 66Ф Ф 100   | m tabl  www. S SUBC  S SUBC  No RCPs ON  C (76)  92 (99)  | e:  \$\\$\\$\\$\\$\\$\\$\\$  00LING ()  \$\\$\\$\\$\\$\\$\\$\\$\\$  1 2 CHG  1 2 CHG  1 Any  1 RCPs  1 RCPs  1 RCPs  1 48 (60  1 48 \$\\$\\$\\$  1 48 \$\\$\\$\\$  1 48 \$\\$\\$\\$  1 48 \$\\$\\$\\$  1 48 \$\\$\\$\\$\\$\\$  1 48 \$\\$\\$\\$\\$\\$\\$\\$  1 48 \$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\   | Pumps Pumps No RCPs RCPs Pumps | rerse Cor<br>PUBLISHED CON<br>PUBLISHED  | tainmer<br>\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$  | nt)  \$\frac{1}{2} \times \frac{1}{2} \times 1   | \$ \$ \$ \$ \$<br>No CHG<br>\$ \$ \$ \$ \$<br>RCPs<br>ON<br>\$ \$ \$ \$<br>49 (61<br>\$ \$ \$ \$<br>(83)   | Pumps Pumps A H R R () B H A B  | ロ   | и ф ф ф ф ф ф ф ф ф ф ф ф ф ф ф ф ф ф ф             | \$\$\$\$<br>\$\$\$\$ |
| ф ф ф ф ф ф ф ф ф ф ф ф ф ф ф ф ф ф ф  | \$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\  | Subcool 1  | ng fro ФЕС Ф Ри Ф П П ФФ П 60 ФФ СС Ф Ри Ф Т П П ФФ Т 10 ФФ Т  | m tabling tabling table of the second  | e:  \$\\$\\$\\$\\$\\$\\$\\$  00LING ()  \$\\$\\$\\$\\$\\$\\$\\$\\$  1 2 CHG  1  \( \D \)  1 Any  1 RCPs | Pumps  | rerse Cor<br>rese Cor<br>rese Cor<br>rese Sor<br>rese  | tainmer<br>b \$ \$ \$ Pumps<br>G Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pumps<br>B Pum | nt)  \$\$\text{\$\ext{\$\text{\$\exititt{\$\text{\$\text{\$\text{\$\text{\$\exititt{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\tex{   | No CHG   | Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римря<br>Римра<br>Римра<br>Римра<br>Римра<br>Римра<br>Р | ロ   | и ф ф ф ф ф ф ф ф ф ф ф ф ф ф ф ф ф ф ф             | \$\$\$\$             |
|  | \$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\  | Subcool 1  | ng fro ФЕС Ф Ри Ф П П ФФ П С Ф В В В В В В В В В В В В В В В В В В   | m table was table of   | e:  \$\\$\\$\\$\\$\\$\\$\\$  00LING (  \$\\$\\$\\$\\$\\$\\$\\$\\$  1 2 CHG  1 2 CHG  1 Any  1 RCPs  1 R | Pumps  | rerse Cor<br>rerse Cor<br>rese Cor<br>rese Sor<br>rese | tainmer  by Pumps  G Pumps  H H H H H H H H H H H H H H H H H H H  | nt)  \$\psi\$ \$\ps | NO CHG<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBSECTION<br>SUBS | Ф Pumps Ф NR() Ф п п Ф п п п Ф п п п Ф п п Ф п п Ф п п Ф п п Ф п п Ф п п Ф п  | ロ   | и ф ф ф ф ф ф ф ф ф ф ф ф ф ф ф ф ф ф ф             | \$\$\$\$             |
|  | \$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\  | Subcool : subcoo   | прет прет прет прет прет прет прет прет  | m tabl  w w w  S SUBC  S W w  MORCPS  ON  (76)  92  (99)  176  (183)  | e:  \$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$  | °F) (Adv<br>ритря<br>ритря<br>ритря<br>н No<br>н RCPs<br>н ON<br>н (103)<br>ритря<br>н (103)<br>ритря<br>н (233)<br>н (239)  | rerse Cor<br>中 1 CH<br>中 1 CH<br>中 1 CH<br>中 RCPs<br>中 RCPs<br>中 N N N N N N N N N N N N N N N N N N N   | tainmer  by Pumps  G Pumps  H H H H H H H H H H H H H H H H H H H  | nt)  \$\psi\$ \$\ps | No CHG  S & & &  Any  RCPs ON  \$ & & &  (83)  NA  | Ф Pumps Ф NR() Ф И И В И И В И И В И И В И И В И И В И И В И И В И И В И И В И И В И И В И И В И  | ロ も ロ は   | о ф п п ф п п ф ф ф ф ф ф ф ф ф ф ф ф ф             | \$\$\$\$             |
|  | \$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\  | Subcool 1  | ng фф RC ф P ф п п фф n 66 фф п т п фф n 1 фф n 1 фф n 1 фф n 1 фф n 1 фф n 1 фф n 1 фф n 1 фф n 1 фф n 1 фф n 1 фф n 1 фф n 1 фф n 1 фф n 1 фф n 1 фф n 1   | m tabl  w w w  S SUBC  S SUBC  MPS  NO  RCPS  ON  W  (76)  (183)  W  (183)  W  (183)  | e:  \$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$\\$  | Pumps  | rerse Cor<br>中 1 CH<br>中 1 CH<br>中 1 CH<br>中 RCPs<br>中 RCPs<br>中 N N N N N N N N N N N N N N N N N N N   | tainmer  by Pumps  G Pumps  H H H H H H H H H H H H H H H H H H H  | nt)  \$\psi\$ \$\ps | No CHG  S & & &  Any  RCPs ON  \$ & & &  (83)  NA  | Ф Pumps Ф NR() Ф И И В И И В И И В И И В И И В И И В И И В И И В И И В И И В И И В И И В И И В И  | ロ も ロ は   | о ф п п ф п п ф ф ф ф ф ф ф ф ф ф ф ф ф             | \$\$\$\$             |

This Step continued on the next page.

36 of 51

Number: Title: Revision Number: LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS AOI 4.2.2 REV. 6 THAN 350 °F **STEP** ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED c. RCS subcooling based on core c. PERFORM the following: exit TCs - GREATER THAN REQUIRED SUBCOOLING 1) IF RCS hot leg temperatures greater than 345°F [335°F for adverse containment]. GO TO Step 43. 2) IF RCS hot leg temperatures less than 345°F [335°F for adverse containment]. START one RHR pump if none running. a) IF RHR Letdown has been in service for cooling the RHR suction piping. CLOSE HCV-133 3) IF at least one RHR pump can NOT be started, GO TO Step 43. d. GO TO Step 31. d. PRZR level - GREATER THAN 28% [47% FOR ADVERSE CONTAINMENT] e. STOP one additional high-head SI pump f. RETURN TO Step 34a 35. CHECK IF Charging Flow Should Be Controlled To Maintain PRZR Level: a. CHECK RHR pumps a. GO TO Step 42. NONE RUNNING WITH SUCTION FROM **RWST** b. CONTROL charging flow to maintain PRZR level

| AOI 4.2.2                             | LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS THAN 350 °F  | REV. 6  |
|---------------------------------------|---|---|
| * * * * * * * * * * * * * * * * * * * | CAUTION  CAUTION  CAUTION  The RCP Seal cooling had been previously lost, the affected RCP(s)  IN NOT be started PRIOR to a status evaluation.  CRESPORSE RESPORSESSESSESSESSESSESSESSESSESSESSESSESSES | 0<br>0<br>0<br>0<br>0<br>aaaaaaa<br>————————————————————— |
| 1                                     | natural circulation.  |   |

b. STOP all but one RCP

STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED

CAUTION

Depressurizing the RCS may result in losing the minimal RCP No. 1 Seal operating conditions. This will require the RCPs to be tripped.

37. <u>DEPRESSURIZE RCS To Minimize RCS</u>
Subcooling:

- a. OPERATE normal PRZR spray
- a. OPERATE one PRZR PORV.
  - IF no PORV available, OPERATE auxiliary spray as follows:
    - a) MAINTAIN RCP Seal Injection flow 6 to 10 GPM
    - b) VERIFY at least one Charging Pump running.
    - c) REDUCE Charging Pump speed to minimum.
    - d) CLOSE HCV-142, Charging Line Flow Control Valve.
    - e) CLOSE Charging Line Stops:
      - o 204B, Loop 21 Cold Leg Norm.
      - o 204A. Loop 22 Hot Leg Alt.
    - f) CLOSE PRZR Spray Valves:
      - o PCV-455A
      - o PCV-455B
    - g) OPEN 212, Auxiliary Spray Valve.

This Step continued on the next page.

Title: Number: Revision Number: LOCA WHEN RCS TEMPERATURE AT LEAST 200 of and less REV. 6 AOI 4.2.2 THAN 350 °F ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED STEP h) INTIATE spray slowly using HCV-142. i) ADJUST Charging Pump speed to control depressurization. b. CONTROL PRZR heaters as necessary c. DEPRESSURIZE RCS until EITHER of the following conditions satisfied: o PRZR level - GREATER THAN 71% [65% FOR ADVERSE CONTAINMENT] - OR o RCS subcooling based oncore exit TCs - LESS THAN VALUE OBTAINED FROM TABLE BELOW #WR RCS PRESSURE # RCS SUBCOOLING °F # # (ADVERSE CONTAINMENT) # (PSIG) 0 - 400Ħ 62 (93) Ħ Ħ 401 - 800 Ħ 46 (59) Ħ 801 - 1200 Д 33 (40) Ħ # 1201 - 2500 # 29 (36) 38. VERIFY Adequate Shutdown Margin: a. DIRECT Chemistry to sample RCS b. Shutdown margin - ADEQUATEb. Borate as necessary.

Number:

AOI 4.2.2

Title:

LOCA WHEN RCS TEMPERATURE AT LEAST 200 THAN 350 °F

°F AND LESS

Revision Number:

REV. 6

**STEP** ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

- 39. CHECK IF Letdown Can Be Established:
  - a. PRZR level GREATER THAN 28% [47% FOR ADVERSE CONTAINMENT]
  - b. ESTABLISH Letdown:
    - 1) CLOSE Letdown Orifice Stops

      - o 200A o 200B
      - o 200C
    - 2) OPEN Letdown Line Isolation Valves (Panel SN)
      - o 201
      - 0 202
    - 3) PLACE Letdown Flow Control Valves 200A B C Switch to REMOTE
    - 4) OPEN LCV-459, Letdwon Stop Valve
    - 5) PLACE PCV-135. Low Pressure Letdown Backpressure Controller in MANUAL AND ADJUST to 75 percent open
    - 6) OPEN Letdown Orifice Stops to establish desired Letdown flow
      - o 200A, 75 GPM Letdown Orifice Stop
      - o 200B. 45 GPM Letdown Orifice Stop
      - o 200C. 75 GPM Letdown Orifice Stop
    - 7) ADJUST PCV-135 in MANUAL OR AUTO to ensure adequate backpressure

- a. Go to Step 40.
- b. ESTABLISH Excess Letdown:
  - 1) ESTABLISH CCW flow to Excess Letdown Heat Exchanger:
    - a) OPEN CCW to Excess Letdown Heat Exchanger Inlet Valves:
      - o 791 o 798
    - b) OPEN CCW to Excess Letdwon Heat Exchanger Outlet Valves:

      - o 796
  - 2) PLACE 215. Excess Letdown Diversion Valve to NORMAL.
  - 3) VERIFY 222, Seal Water Return Containment Isolation Valve OPEN.
  - 4) VERIFY HCV-123, Excess Letdown Flow Control Valve CLOSED.
  - 5) OPEN 213. Excess Letdown Isolation Stop.
  - 6) Slowly OPEN HCV-123 to warmup the Excess Letdown Heat Exchanger.
  - 7) ESTABLISH desired Excess Letdown flow using HCV-123.
  - 8) MAINTAIN Excess Letdown Heat Exchanger outlet temperature less than 195°F

Number: Title: Revision Number: LOCA WHEN RCS TEMPERATURE AT LEAST 200 of and less A0I 4.2.2 REV. 6 THAN 350 °F RESPONSE NOT OBTAINED **STEP** ACTION/EXPECTED RESPONSE 40. CHECK VCT Makeup Control System: Adjust controls as necessary. a. Makeup controls - SET FOR GREATER THAN RCS BORON CONCENTRATION b. PLACE makeup controls in automatic ALIGN Charging Pump Suction 41. To VCT a. OPEN LCV-112C, Charging Pump Suction From VCT b. CLOSE LCV-112B, Charging Pump Suction From RWST 42. VERIFY SI Flow Not Required: a. RCS subcooling based on a. Manually START SI pumps as core exit TCs - GREATER THAN necessary. DO NOT\_EXCEED ONE VALUE OBTAINED FROM TABLE TRAIN OF SI PUMP OPERATION. GO TO Step 43. #WR RCS PRESSURE # RCS SUBCOOLING °F # # (ADVERSE CONTAINMENT)# (PSIG) 0 - 400 Ħ 52 (83) Ħ 401 - 800 Ħ Ħ 36 (49) Ħ 801 - 1200 23 (30) Ħ п ¤ 1201 - 2500 ¤ 19 (26) b. PRZR level - GREATER THAN b. Manually START SI pumps as 14% [33% FOR ADVERSE necessary. DO NOT\_EXCEED ONE TRAIN OF SI PUMP OPERATION. CONTAINMENT] GO TO Step 43.

|               | Title:  | Revision Number:  |
|---------------|---|---|
| .2.2          | LOCA WHEN RCS TEMPERATURE AT LEAST<br>THAN 350  | I DLV L   |
| PH            | ACTION/EXPECTED RESPONSE  | RESPONSE NOT OBTAINED   |
|               | RIFY Additional SI Flow Not   |   |
| ā.            | CHECK RVLIS indication - a GREATER THAN VALUE OBTAINED FROM TABLE:  | . START one additional SI pump<br>(23 preferred).   |
| <i>j</i><br>: | マもちもちちちものちちもちちちちちちちち<br>AND either 21 OR 23 SI Pump<br>¤ NO. OF ¤RVLIS NATURAL¤RVLIS RCP¤<br>¤ RCPS ¤ CIRCULATION ¤ RUNNING ¤ | is <u>NOT</u> running. VERIFY the appropriate Outlet Tie  |
| 1<br>1        | и 1 и 555 и 24% и<br>и 2 и 555 и 31% и<br>и 3 и 555 и 44% и   | valve is CLOSED<br>歩歩歩歩歩歩歩ゆ<br>o 21 Pump running - 851A<br>- OR -<br>o 23 Pump running - 851B   |
|               | ፵፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟፟   | 歩歩歩歩歩歩歩歩▲<br>o. START one additional SI Pump<br>(23 preferred)  |
|               | MECK IF Diesel Generators Should  Stopped:  |   |
| a.            | . VERIFY 480V buses - ENERGIZED a<br>BY OFFSITE POWER   | . ATTEMPT to restore offsite power to ac emergency busses.  |
| b.            | VERIFY the following MCCs - ENERGIZED   |   |
|               | o MCC 24<br>o MCC 27<br>o MCC 29  |   |
| c.            | . CHECK MCC 28 AND 28A - C<br>ENERGIZED   | . <u>IF</u> Containment sump level less<br>than 44'3" AN <u>D</u> Containment<br>conditions NO <u>T</u> adverse, RESET<br>MCC 28 A <u>ND</u> MCC 28A. |
| d.            | CHECK Containment sump level - c  | . TRIP MCC 28 AND <u>28</u> A.  |
| е.            | . STOP any unloaded diesel<br>generator and place in standby  |   |

| Number:   | LOCA WHEN RCS TEMPERATURE   | AT LEAST 200 °F AND LESS DEV. 6   |
|-----------|---|---|
| AOI 4.2.2 | 1   | AN 350 °F REV. 6  |
| STEP      | ACTION/EXPECTED RESPONSE  | RESPONSE NOT OBTAINED   |
|           | CUTOK DOD Condition NORMAL  | <del>1</del>  |
| 45.       | CHECK RCP Cooling - NORMAL  |   |
|           | a. CHECK RCP CCW System alarms -<br>CLEAR   | <ul> <li>a. ESTABLISH CCW flow to RCP         Thermal Barriers per SOP         4.1.2, Component Cooling         System Operation.     </li> </ul> |
|           | <ul> <li>CHECK RCP seal injection flow</li> <li>BETWEEN 6 GPM AND 10 GPM PER RCP</li> </ul>       | <ul><li>b. ESTABLISH seal injection flow<br/>to RCPs per SOP 3.1, Charging,<br/>Sealwater And Letdown Control.</li></ul>                          |
| 46.       | CHECK IF RCP Seal Return Flow Should Be Established:  |   |
|           | a. RCP Thermal Barrier $\Delta P$ - POSITIVE  | a. GO TO Step 47.   |
|           | b. CCW Pumps - AT LEAST ONE RUNNING   | b. GO TO Step 47.   |
|           | c. ESTABLISH Seal Return flow:  | c. Manually OPEN valves.  |
|           | <ol> <li>VERIFY No. 1 Seal Return<br/>Valves - OPEN</li> </ol>                                    |   |
|           | <ul><li>VERIFY Seal return<br/>Containment Isolation Valve</li><li>OPEN</li></ul>                 |   |
| 47.       | CHECK IF RCPs Must Be Stopped:  | -   |
|           | a. CHECK the following:   |   |
|           | o Number 1 seal differential<br>pressure - LESS THAN 200 PSID                                     |   |
| :         | - OR -  |   |
|           | o Number 1 seal leakoff flow -<br>LESS THAN 0.2 gpm AND <u>sea</u> l<br>temperatures - INCREASING |   |
|           | b. STOP affected RCP(s)   |   |
|           |   |   |

| Number:<br>AOI 4.2.2 | LOCA WHEN RCS TEMPERATURE AT LEA<br>THAN 350  | DEV C   |
|----------------------|---|---|
| STEP                 | ACTION/EXPECTED RESPONSE  | RESPONSE NOT OBTAINED                                     |
| 48.                  | CHECK Containment Hydrogen Concentration:   |   |
|                      | a. OBTAIN a hydrogen concentration measurement:   |   |
|                      | o DISPATCH Chemistry personnel to obtain sample   |   |
|                      | - OR -  |   |
|                      | o OPERATE H <sub>2</sub> -O <sub>2</sub> Analyzer on<br>Accident Assessment Panel                                       |   |
|                      | b. Hydrogen concentration - LESS<br>THAN 0.5% IN DRY AIR  | <ul> <li>CONSULT Technical Support<br/>Center.</li> </ul> |
| 49.                  | CHECK IF RHR System Can Be Placed In Service:   |   |
|                      | a. CHECK the following:   | a. GO TO Step 51.   |
|                      | o RCS temperatures - LESS THAN 350°F  |   |
|                      | o RCS pressure - LESS THAN<br>370 PSIG [270 PSIG FOR<br>ADVERSE CONTAINMENT]  |   |
|                      | <ul> <li>CONSULT Technical Support<br/>Center to determine if RHR<br/>System should be placed in<br/>service</li> </ul> |   |
| 50.                  | CHECK RCS Temperatures - LESS THAN 200°F  | RETURN TO Step 20.  |
| 51.                  | EVALUATE Long Term Plant Status:  |   |
|                      | a. MAINTAIN cold shutdown<br>conditions per POP 3.3, Plant<br>Cooldown  |   |
|                      | b. CONSULT Technical Support<br>Center  |   |
|                      | -END-   |   |

## 6.0 REFERENCES

## 6.1 <u>DEVELOPMENT DOCUMENTS</u>

- 6.1.1 Westinghouse Abnormal Repsonse Guideline ARG-2, Revision 1
- 6.1.2 Emergency Operating Procedures, Revision 38

### 6.2 <u>INTERFACING DOCUMENTS</u>

### 6.2.1 PROCEDURES

- AOI 1.7, Excessive Reactor Coolant System Leakage
- AOI 4.2.3, Transfer To Cold Leg Recirculation During LOCA When RCS Temperature At Least 200°F And Less Than 350°F
- SOP 1.3, Reactor Coolant Pump Startup and Shutdown
- AOI 27.1.9, Control Room Inaccessability Safe Shutdown Control
- POP 3.3, Plant Cooldown
- SOP 3.1, Charging, Sealwater And Letdown System Control
- SOP 4.1.2, Component Cooling System Operation
- SOP 12.3.2, Digital Radiation Monitoring System Operation (Local Or SRD)

### 6.3 **COMMITMENTS**

None

### 6.4 UFSAR

None

| lumber:     | Title:   | Revision Number: |
|-------------|--|------------------|
| AOI 4.2.2   | LOCA WHEN RCS TEMPERATURE AT LEAST 200°F AND LESS  | REV. 6           |
|             |  |                  |
|             | ATTACHMENT 1 (Attachme ISOLATION OF STEAM GENERATOR TUBE LEAK/RUPTURE                                  | nt page 1 of 3)  |
| _           | EFER TO the Emergency Porcedures Document Book 1, Emergency lassifications                             | _                |
|             | NSURE the affected SG(s) atmospheric steam dump controller is in UTO AND set at 74 percent (1030 psig) |                  |
| * * *       | *  | * * * * * * * *  |
| *           | CAUTION  | *                |
| * *         | OO AEU Dumm is the only soumes of food flow the steem sumply shall be                                  | *                |
|             | 22 AFW Pump is the only source of feed flow, the steam supply shall be<br>ntained from one SG.         | ;<br>*           |
| *           | meathea from one sa.   | *                |
| * * *       | *  | * * * * * * * *  |
|             | SISPATCH an NPO to CLOSE the steam supply header stops from the effected SG(s)                         | <del></del>      |
| _           | MS-41 (SG 22)<br>MS-42 (SG 23)   |                  |
| 4. <u>E</u> | NSURE the affected MSIV(s) are CLOSED  |                  |

○ The remaining steps are required to limit secondary plant contamination

ENSURE the affected SG (s) MSIV(s) Bypass Stop(s) (MS-55s) are

(9) AND should be performed while contiuing to step 14f.

**CLOSED** 

0

NOTE

ര

(3)

0

О О

| Number:   | Title:  | Revision Number: |
|-----------|---|------------------|
| AOI 4.2.2 | LOCA WHEN RCS TEMPERATURE AT LEAST 200°F AND LESS | REV. 6           |

ATTACHMENT 1

(Attachment page 2 of 3)

ISOLATION OF STEAM GENERATOR TUBE LEAK/RUPTURE

- 6. ENSURE the affected SG(s) MSIV upsteam traps are CLOSED
  - a)  $\underline{\text{IF}}$  21 SG has primary to secondary leakage. CLOSE the following valves:
    - o MS-99-29, MST 8 Root Stop Outlet
    - o MS-99-47. MST 6 Root Stop Outlet
    - o MS-102-8. MST 5 Root Stop Outlet
    - o MS-105-11. MST 1 Root Stop Outlet
  - b) <u>IF</u> 22 SG has primary to secondary leakage, CLOSE the following valves:
    - o MS-99-38. MST 9 Root Stop Outlet
    - o MS-99-35. MST 10 Root Stop Outlet
    - o MS-99-32. MST 12 Root Stop Outlet
    - o MS-105-20, MST 2 Root Stop Outlet
  - c) <u>IF</u> 23 SG has primary to secondary leakage, CLOSE the following valves:
    - o MS-105-14, MST 3 Root Stop Outlet
    - o MS-99-15. MST 16 Root Stop Outlet
    - o MS-99-20, MST 14 Root Stop Outlet
    - o MS-102-3, MST 13 Root Stop Outlet
  - d) <u>IF</u> 23 SG has primary to secondary leakage. CLOSE the following valves:
    - o MS-105-17. MST 4 Root Stop Outlet
    - o MS-99-22, MST 18 Root Stop Outlet
    - o MS-99-26, MST 20 Root Stop Outlet
- 7. ENSURE the following secondary plant steam valves are CLOSED:
  - o Turbine Stop Valves
  - o Condenser steam Dump Valves
  - o Moisture Separator Reheater Stops (MS-6s)
  - o 21 MBFP Stop (MS-7)
  - o 22 MBFP Stop (MS-7-1)
  - o SJAE Stop (MS-8)
  - o Gland Steam Stop (MS-66)

| Number:   | Title:  | Revision Number: |
|-----------|---|------------------|
| AOI 4.2.2 | LOCA WHEN RCS TEMPERATURE AT LEAST 200°F AND LESS | REV. 6           |

|    |            | ATTACHMENT 1 ISOLATION OF STEAM GENERATOR TUBE LEAK/RUPTURE | (Attachment page 3 of 3) |
|----|------------|---|--------------------------|
|    |            | ISOLATION OF STEAM GENERATOR TOBE LEAK/KOPTORE              |                          |
| 8. | OPERATE +  | ne unaffected atmospheric steam dumps as necessary          | to                       |
| ٠. | control RO | S Hot Leg temperature                                       |                          |
|    |            |   |                          |
|    |            | -END-   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |
|    |            |   |                          |

| Number:   | Title:  | Revision Number: |
|-----------|---|------------------|
| AOI 4.2.2 | LOCA WHEN RCS TEMPERATURE AT LEAST 200°F AND LESS | REV. 6           |

# ATTACHMENT 2 NATURAL CIRCULATION VERIFICATION

(Attachment page 1 of 1)

- 1. <u>The following conditions support OR indicate natural circulation</u> flow:
  - o RCS subcooling based on core exit TCs GREATER THAN VALUE OBTAINED FROM TABLE:

mwr rcs pressure m rcs subcooling of m (PSIG) # (ADVERSE CONTAINMENT)# 0 - 400 Ħ 52 (83) 36 (49) 401 - 800 Ħ н 801 - 1200 Ħ Ħ 23 (30) Ħ ¤ 1201 - 2500 Ħ 19 (26) 

- AND -
- o SG pressures STABLE OR DECREASING
  - AND -
- o RCS Hot Leg temperatures STABLE OR DECREASING
  - AND -
- o Core exit TCs STABLE OR DECREASING
- 2. IF natural circulation can NOT be verified, INCREASE steam dump.

-END-

ATTACHMENT 3

(Attachment page 1 of 1)

PHASE A AND VENTILATION ISOLATION VALVES

- 1. The following valves will CLOSE on a Containment Isolation
  Phase A:
  - o 796 AND 793, CCW from the Excess Letdwon Heat Exchanger
  - o 798 AND 791, CCW to the Excess Letdwon Heat Exchanger
  - o 1786 AND 1787. Vent Header from The RCDT
  - o 548 AND 549, Gas Analyzer from the PRT
  - o 1788 AND 1789. Gas Analyzer from the RCDT
  - o 201 AND 202, Letdown from the Regenerative Heat Exchanger
  - o 200A, 200B AND 200C. Letdown Orifice Control Stops
  - o 519 AND 552. PW Makeup to the PRT
  - o 1723 AND 1728. Containment Sump Pumps to the WHUT
  - o PCV-1228. Instrument Air to Containment
  - o PCV-863, Accumulator N2 Supply Line Stop
  - o 1702 AND 1705, RCDT to the WHUT
  - o PCV-1234, PCV-1235, PCV-1236 AND PC<u>V-12</u>37, R-41/R-42 Supply AND Return from Containment
  - o 956G AND 956H, Accumulator Sample
  - o 956A AND 956B, Pressurizer Steam Space Sample
  - o 956C AND 956D. Pressurizer Liquid Space Sample
  - o MOV-956E AND MOV-956F, RCS Hot Leg 21 AND 23 <u>Samp</u>le
  - o 1229 AND 1230, SJAE to Containment
  - o MOV-4399 AND MOV-5132, Hi-Rad Sample System Return to Containment Sump
  - o MOV-990A AND MOV-990B, Recirculation Pump Discharge Sample Line
- 2. The following ventilation isolation valves will CLOSE:
  - o FCV-1170 AND FCV-1171, Purge Air to Containment
  - o FCV-1172 AND FCV-1173. Purge Air from Containment
  - o PCV-1190, PCV-1191 AND <u>PCV-</u>1192, Containment Pressure Relief Valves

-END-

Number:

AOI 4.2.2

Title:

LOCA WHEN RCS TEMPERATURE AT LEAST 200

of and less

Revision Number:

REV. 6

## TABLE OF CONTENTS

THAN 350 °F

| STEP NO     | <u>).</u>                                      | DESCRIPTION                              | PAGE NO. |
|-------------|--|--|----------|
| 1.0         | PURPOSE  |  | 2        |
| 2.0         | SYMPTOMS/ENTRY CONDITIONS                      |  | 2        |
| 3.0         | AUTOMATIC ACTIONS                              |  | 2        |
| 4.0         | IMMEDIATE OPERATOR ACTIONS                     |  | 2        |
| 5.0         | OPERATOR ACTIONS                               |  | 3        |
| 6.0         | REFERENCES                                     |  | 47       |
|             | 6.1 DEVELOPMENT DOCUMENTS                      |  | 47       |
|             | 6.2 INTERFACING DOCUMENTS                      |  | 47       |
|             | 6.2.1 PROCEDURES                               |  | 47       |
|             | 6.3 COMMITMENTS                                |  | 47       |
|             | 6.4 <u>UFSAR</u>                               |  | 47       |
| <u>ATT/</u> | ACHMENTS                                       |  |          |
|             | ATTACHMENT 1<br>ISOLATION OF STEAM GENERATOR T | UBE LEAK/RUPTURE                         | 48       |
|             | ATTACHMENT 2 NATURAL CIRCULATION VERIFICATION  | NG NG NG NG NG NG NG NG NG NG NG NG NG N | 51       |
|             | ATTACHMENT 3 PHASE A AND VENTILATION ISOLATION | ON VALVES                                | 52       |

## 1. <u>PURPOSE</u>

o This procedure provides instruction to the operator during the abnormal opeating condition in which a LOCA occurs when the Reactor Coolant System (RCS) temperature is greater than 200°F, but less than 350°F.

## 2. SYMPTOMS/ENTRY\_CONDITIONS

- a) An uncontrolled Reactor Coolant System (RCS) depressurization.
- b) PRESSURIZER LOW PRESS 2185 PSIG (SAF Window 3-2) alarm.
- c) <u>IF</u> initial RCS pressure was greater than 1940 psig AND the Low Pressure Safety Injection (SI) remains unblocked:
  - 1) PRESSURIZER LOW PRESSURE SI 1840 PSIG alarm (first out).
- d) Uncontrolled decreasing Pressurizer level.
- e) PRESSURIZER LOW LEVEL 18% 5% (SAF Window 3-3) alarm.
- f) PRESSURIZER LO LO LEVEL CHANNEL TRIP 5% (SAF Window 4-3) alarm.
- g) Uncontrolled decreasing margin to saturation.
- h) SATURATION TEMPERATURE MARGIN APPROACHED (FCF Window 4-7) alarm.
- i) Uncontrolled increasing Pressurizer level (vapor space LOCA)
- j) PRESSURIZER HIGH LEVEL 70% 5% (SAF Window 1-3) alarm.
- k) CONTAINMENT HIGH PRESS SI 2 PSIG alarm (first out).
- 1) CONTAINMENT SUMP WATER LEVEL HIGH HIGH (SBF-1 Window 1-1) alarm.
- m) Increasing activity on R-41. Containment Particulate Activity  $\overline{OR}$  R-42. Containment Gaseous Activity monitors.
- n) R-41/R-42 CNTMT AIR HI RAD/TROUBLE (SAF Window 2-7) alarm.
- o) Increasing activity on R-43, Plant Vent Particulate Activity OR R-44, Plant Vent Gaseous Activity monitors.
- p) R-43/R-44 PLANT VENT HI RAD/TROUBLE (SAF Window 2-8) alarm.
- q) <u>IF</u> initial RCS pressure was greater than 1000 psig AND accumulators remain unisolated:
  - 2X ACCUMULATOR LEVEL HIGH LO (SBF Windows 1-9. 2-9. 3-9. 4-9)alarm.
  - 2) 2X ACCUMULATOR PRESSURE HIGH LOW (SBF-1 Windows 1-10, 2-10, 3-10, 4-10) alarm.
- r)  $\underline{\text{IF}}$  Residual Heat Removal System (RHR) is in service. a reduced  $\underline{\text{OR}}$  fluctuating RHR flow which could be indication of pump cavitation OR  $\underline{\text{vo}}$  retexing.

| Number:   | Title:                                 | Revision Number: |
|-----------|--|------------------|
| A0I 4.2.2 | LOCA WHEN RCS TEMPERATURE AT LEAST 200 | REV. 6           |

## 3. AUTOMATIC ACTIONS

- a) <u>IF</u> 2185 psig Pressurizer pressure is reached AND Press<u>urizer</u> level (hot calibrated) is greater than 18 percent, all Pressurizer heaters energize.
- b) <u>IF</u> a pressure of 1840 psig is reached AND Low Pressure Safety Injection (SI) is unblocked OR Containment pressure reaches 2 psig, the following should occur:
  - o Safety Injection is initiated
  - o Containment Phase A Isolation is initiated
  - o Containment Ventilation Isolation is initiated
- c) IF 18 percent Pressurizer level is reached:
  - o LCV-459, Letdown Isolation Stop closes
  - o All Pressurizer heaters de-energize
- d) <u>IF</u> an increasing Pressurizer level of 5 percent above programmed level is reached:
  - o All Pressurizer heaters energize
- e) <u>IF</u> R-41/R-42 CNTMT AIR HI RAD/TROUBLE (high) alarm occurs. Containment Ventilation Isolation is initiated.

### 4. IMMEDIATE OPERATOR ACTIONS

o None

| Number:     | Title:   | Revision Number: |
|-------------|--|------------------|
| A0I 4.2     | LOCA WHEN RCS TEMPERATURE AT LEAST 200   | REV. 6           |
| STEP        | ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED   |                  |
| L           |  |                  |
| *           | <u>CAUTION</u>   | * * * * * *      |
| * *         | <ul> <li>Prior to dispatching personnel to perform local actions, an evaluation<br/>of the local environmental conditions including radiation shall be<br/>performed.</li> </ul> | *<br>*<br>*      |
| *<br>*<br>* | o <u>IF</u> conditions to cause an automatic SI exist, BUT an au <u>toma</u> tic SI has <u>NOT</u> occurred, a manual SI shall NOT be <u>ini</u> tiated.                         | *<br>*           |
| *           | *  | * * * * * *      |
|             | <br>ඉතුතුතුතුතුතුතුතුතුතුතුතුතුතුතුතුතුතුතු  |                  |
| 9 9         | <del></del>  | 0<br>0<br>0      |
| O C         |  | ()<br>()         |
|             | ĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸ  | adadadada        |
| 1.          | CHECK IF RHR Pumps Should Be Stopped:  |                  |
| ÷           | a. CHECK the following:  a. IF none of the conditions satisfied, GO TO Step 2.   |                  |
|             | o PRZR level -LESS THAN 14% [33% FOR ADVERSE CONTAINMENT]  |                  |
|             | - OR -   |                  |
|             | o RCS subcooling based on core exit TCs - LESS THAN VALUE OBTAINED IN TABLE BELOW  |                  |
|             | ✓ ७ ७ ७ ७ ७ ७ ७ ७ ७ ७ ७ ७ ७ ७ ७ ७ ७ ७ ७  |                  |
|             | ¤ (PSIG) ¤(ADVERSE CONTAINMENT)¤<br>ঔড়<br>¤ 0 - 400 ¤ 52 (83) ¤   |                  |
|             | н 401 - 800 н 36 (49) н<br>н 801 - 1200 н 23 (30) н  |                  |
|             | ¤ 1201 - 2500  |                  |
|             | - OR -   |                  |
|             | o Any SI pump - RUNNING  | <del></del>      |

Title: Number: Revision Number: LOCA WHEN RCS TEMPERATURE AT LEAST 200 •F AND LESS A0I 4.2.2 REV. 6 THAN 350 °F STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED b. STOP RHR pumps AND\_place switches in PULL OUT c. CLOSE RHR Hot Leg Suction Stops o MOV-730 - AND o MOV-731 d. CONSULT Shift Manager (SM) to  $\,$  d. GO TO Step 2 DETERMINE IF valve 732, Inlet Line CIV should be closed e. CLOSE valve 732 2. ISOLATE RCS Letdown: a. CHECK CVCS letdown valves - a. Manually CLOSE valves CLOSED o 200A o 200B o 200C o LCV-459 o 213 b. CHECK HCV-133, RHR letdown b. Manually CLOSE HCV-133 valve - CLOSED

Number: Title: Revision Number:

A0I 4.2.2 LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS REV. 6

STEP ACTION/EXPECTED RESPONSE RESPONSE RESPONSE NOT OBTAINED

3 CHECK IE Charging Flow Is

- 3. <u>CHECK IF Charging Flow Is</u> Adequate:
  - ADJUST charging flow as necessary to maintain pressurizer level
  - b. CHECK PRZR level:

- b. Go to Step 4.
- o GREATER THAN 14% [33% FOR ADVERSE CONTAINMENT
- o STABLE OR INCREASING
- c. RCS subcooling based on core exit TCs- GREATER THAN VALUE OBTAINED FROM TABLE BELOW
- c. Go to Step 4.

#WR RCS PRESSURE # RCS SUBCOOLING °F # (PSIG) □ (ADVERSE CONTAINMENT) □ 0 - 400 Ħ 52 (83) Ħ Ħ 401 - 800 Ħ 36 (49) Ħ 801 - 1200 23 (30) ц Ħ ¤ 1201 - 2500 Ħ 19 (26) Ħ 

- d. Charging flow LESS THAN CAPACITY OF TWO CHARGING PUMPS
- d. Go to Step 4.
- e. RETURN TO POP OR SOP in effect to RESTORE the remainder of the RCS/CVCS/RHR systems to pre-event status
  - REFER TO AOI 1.7. Excessive Reactor Coolant System Leakage. to aid in determining the source of leakage

| STEP ACTION/EXPECTED RESPONSE  | RESPONSE NOT OBTAINED   |
|--|---|
| * * * * * * * * * * * * * * * * * * *  | ft AND SI is_aligned to the   |
| 4. <u>VERIFY Proper SI System Alignment</u> a. SI pump cold leg injection valves - OPEN  o 856A o 856E | a. Manually OPEN valves   |
| o 856C<br>o 856D<br>b. 22 SI pump suction stops - OPEN<br>o 887A<br>o 887B                             | b. Manually OPEN valves   |
| <ul><li>c. 22 SI pump discharge isolations - OPEN</li><li>o 851A</li><li>o 851B</li></ul>              | c. Manually OPEN valves   |
| <ul><li>d. RHR hot leg suction stops -<br/>CLOSED</li><li>o MOV-730</li><li>o MOV-731</li></ul>        | <ul> <li>d. PERFORM the following</li> <li>1) VERIFY RHR pumps are secured AND in PULL OUT</li> <li>o 21 RHR Pump</li> <li>o 22 RHR Pump</li> </ul>                       |
|  | <ul> <li>2) CLOSE 730 AND 731</li> <li>3) CONSULT SM to determine IF valve 732, Inlet Line CIV should be closed</li> <li>a) IF directed by SM, CLOSE valve 732</li> </ul> |

This Step continued on the next page.

STEP ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

- e. SI pumps NONE RUNNING
- e. GO TO Step 4i

f. CHECK the following:

- f. <u>IF</u> neither condition satisfied, GO TO Step 5
- o PRZR level -LESS THAN 14%
  [33% FOR ADVERSE CONTAINMENT]

- OR -

O RCS subcooling based on core exit TCs - LESS THAN VALUE OBTAINED FROM TABLE BELOW:

#WR RCS PRESSURE # RCS SUBCOOLING of # (PSIG) # (ADVERSE CONTAINMENT)# 0 - 400 Ħ 52 (83) П 401 - 800 ¤ Ħ 36 (49) 801 - 1200 Ħ. 23 (30) Ħ я 1201 - 2500 я 19 (26) 

g. START 21 SI pump

- g. PERFORM the following:
  - 1) VERIFY MOV-851B. 22 SI Pump Tie Valve To Outlet of 23 SI Pump is CLOSED
  - 2) START 22 SI Pump
    - a) <u>IF</u> 22 SI Pump will NOT \_\_\_\_ start. START 23 SI Pump

This Step continued on the next page.

STEP — ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

h. CHECK 22 SI pump - OFF

- h. <u>IF</u> 22 SI Pump is running due to SI actuation AND <u>either 21</u> <u>OR</u> 23 SI Pump is NOT <u>run</u>ning. PERFORM the following:
  - IF 21 AND 22 SI Pumps running. PERFORM the following:
    - a) VERIFY MOV-851B OPEN
    - b) VERIFY MOV-851A CLOSED
    - c) GO TO Step 4i
  - 2) <u>IF 22 AND 23 SI Pumps</u> running. PERFORM the following:
    - a) VERIFY MOV-851A OPEN
    - b) VERIFY MOV-851B CLOSED
    - c) GO TO Step 4i
  - 3) <u>IF</u> only 22 SI Pump running, PERFORM the following:
    - a) OPEN AND DE-ENERGIZE either MOV-851A OR \_\_\_ MOV-851B
    - b) GO TO Step 4i

- i. PLACE N<u>ON-RUNNING SI</u> Pumps in PULL OUT
- 5. <u>EVACUATE Non-essential Personnel</u> <u>In Containment</u>

Number: Title: Revision Number: LOCA WHEN RCS TEMPERATURE AT LEAST 200 oF AND LESS AOI 4.2.2 REV. 6 THAN 350 °F **STEP** ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED VERIFY Containment Isolation 6. Phase A: a. Phase A valves - CLOSED PER a. Manually ACTUATE Phase A AND \_\_\_\_ ATTACHMENT 3 manually CLOSE valves. b. IVSW valves - OPEN: b. Manually OPEN valves o 1410 o 1413 o SOV-3518 o SOV-3519 c. WCP valves - OPEN: c. Manually OPEN valves o PCV 1238 o PCV 1239 o PCV 1240 o PCV 1241 d. PLACE personnel AND equipment hatch solenoid control switches on CCR Panel SM to INCIDENT

| Number:   |       | Title:  | <del></del>                |   | Revision Number:         |
|-----------|-------|---|----------------------------|---|--------------------------|
| A01 4.2.2 |       | LOCA WHEN RCS TEMPERATU   | ire at least<br>Than 350 ' |   | REV. 6                   |
| STEP      | A     | CTION/EXPECTED RESPONSE   |                            | RESPONSE NOT OBTAINED   | 7                        |
| F8        | abbi  | ্ব প্রথম ব্যব্যব্যব্যব্যব্যব্যব্যব্যব্যব্যব্যব্যব   | ।<br>প্রস্থস্থস্থস্থ       | ্ব্যুত্ত্বত্ত্বত্ত্বত্ত্ত্ত্ত্ত্ত্ত্ত্ত্ত্ত্  | —<br>Равравраврар        |
| 0         | aaa   | <b>44444444444</b> 44   | ውଷଷ<br><u>NOTE</u>         |   | 9                        |
| 0         | throu | f the normal requirements for ghout this procedure. Step 7 lin this procedure.                  |                            |   | 0<br>0<br>0<br>0         |
|           |       | , 444444444444444444444444444444444444  |                            | <b>අඅඅ</b> තුතුතුතුතුතුතුතු   | <b>স্বস্বস্বস্বস্বস্</b> |
| 7.        |       | CK IF RCPs Must Be Stopped:   | <del></del>                |   |                          |
|           | a.    | o Number 1 seal differential pressure - LESS THAN 200 PS  |                            | a. <u>IF</u> neither condition satisfied, GO TO Step  | 8.                       |
|           |       | - OR -  |                            |   |                          |
|           |       | o Number 1 seal leakoff flow<br>LESS THAN 0.2 gpm AND <u>sea</u> l<br>temperatures - INCREASING | -                          |   |                          |
| ·         | b.    | STOP affected RCP(s)  |                            |   |                          |
| 8.        | Res   | PATCH Personnel To Locally<br>tore Power To selected  |                            |   |                          |
|           | a.    | RESET Lighting  |                            |   |                          |
| ;         | b.    | RESET A <u>LL M</u> CCs except MCC 28<br>AND MCC 28A  |                            |   |                          |
|           | c.    | CHECK MCC 28 AND MCC 28A - TRIPPED  | ` (                        | c. <u>IF</u> Containment Sump le<br>greater than 44 feet 3<br>TRIP MCC 28 AN <u>D MC</u> C 28 | inches,                  |
|           |       |   |                            |   |                          |
|           |       |   |                            |   |                          |
|           |       |   |                            |   |                          |

Title: Number: Revision Number: LOCA WHEN RCS TEMPERATURE AT LEAST 200 of and less AOI 4.2.2 REV. 6 THAN 350 °F STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED 9. CHECK IF RHR Pump Aligned In SI CONTINUE with Step 12 while PERFORMING the following: Mode: a. MOV-882, RHR Pump Suction From a. ALIGN RHR pump suction to RWST RWST - OPEN as follows: 1) IF RCS hot leg temperature less than 250°F, OPEN MOV-882. RHR Pump Suction From RWST. 2) IF RCS hot leg temperature greater than 250°F, PERFORM the following: a) OPEN 201 AND 202. Letdown Line Isolation Stops b) PLACE PCV-135, Letdown Backpressure Control in MANUAL AND OPEN fully c) PLACE LCV-112A. Normal/Divert VCT Tank Inlet to DIVERT d) Fully OPEN HCV-133, RHR Letdown Flow Control e) WHEN RHR Pump Suction Temperature is 250°F OR less, PERFORM the following: 1. CLOSE the following valves: o HCV-133 o 201 o 202 2. PLACE LCV-112A.

This Step continued on the next page.

Normal/Divert VCT Tank Inlet to AUTO

3. OPEN MOV-882

| Number:<br>AOI 4.2.2 | LOCA WHEN RCS TEMPERATURE AT 1  | Revision Number:  LEAST 200 °F AND LESS  REV. 6   |
|----------------------|---|---|
| STEP                 | ACTION/EXPECTED RESPONSE  | RESPONSE NOT OBTAINED   |
|                      | b. MOV-744. RHR Discharge Stop -<br>OPEN                              | b. Manually OPEN MOV-744  |
|                      | c. RHR heat exchanger MOVs - OPEN  o 745A o 745B o 746 o 747          | c. Manually OPEN valves   |
|                      | d. RHR heat exchanger Flow<br>Control Valves - OPEN<br>o 638<br>o 640 | d. Manually OPEN valves   |
| 10.                  | CHECK IF CCW Pumps Aligned In SI Mode:                                |   |
|                      | a. VERIFY at least one CCW Pump - RUNNING                             | <ul> <li>a. VERIFY Auxiliary Component Cooling - RUNNING</li> <li>1) WHEN CCW pump becomes available. START one CCW Pump</li> </ul> |
| :                    | b. OPEN RHR Heat Exchanger CCW<br>Outlet Valves:                      |   |
|                      | o 822A<br>o 822B  |   |
|                      |   |   |
|                      |   |   |
|                      |   |   |
|                      |   |   |

Title: Number: Revision Number: LOCA WHEN RCS TEMPERATURE AT LEAST 200 •F AND LESS AOI 4.2.2 REV. 6 THAN 350 °F

RESPONSE NOT OBTAINED **STEP** ACTION/EXPECTED RESPONSE

- CHECK IF RHR Flow Required: 11.
  - a. RCS subcooling based on core exit TCs - LESS THAN VALUE **OBTAINED FROM TABLE BELOW:**
- a. GO TO Step 12.

#WR RCS PRESSURE # RCS SUBCOOLING °F # (PSIG) # (ADVERSE CONTAINMENT)# 0 - 400 ¤ 52 (83) Д 401 - 800 Ħ 36 (49) Ħ 801 - 1200 ¤ 23 (30) Ħ ¤ 1201 - 2500 ¤ 19 (26) Ħ 

- b. RHR Pump suction temperature b. GO TO Step 12 LESS THAN OR EQUAL TO 250°F

c. START one RHR pump

|   | #     |
|---|-------|
| STEP ACTION/EXPECTED RESPONSE RESPONSE RESPONSE NOT OBTAINED  ################################### | 00000 |
| # # # # # # # # # # # # # # # # # # #   |       |

Number: Title: Revision Number: LOCA WHEN RCS TEMPERATURE AT LEAST 200 of and less AOI 4.2.2 REV. 6 THAN 350 °F **STEP** ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED 14. INITIATE Evaluation Of Plant Status: a. CHECK Plant Vent Particulate a. START R-43 AND R-44 per SOP AND Gaseous Activity Monitors 12.3.2, Digital Radiation - IN SERVICE Monitoring System Operation (Local Or SRD) o R-43 o R-44 b. RESTORE PAB ventilation per SOP 11.1 (Ventilation System Operation) c. CHECK PAB radiation - NORMAL c. ISOLATE CVCS OR RHR breaker in PAR o R-43

- REFER TO Emergency Procedures Document Book 1, Emergency Classifications
- d. ISOLATE RCS, CVCS OR RHR break in Containment
  - 1) REFER TO Emergency Procedures Document Book 1. Emergency Classifications

- d. CHECK indications in Containment - NORMAL
  - o R-25 OR R26

o R-44

o R-4

o R-5987

- o R-41 OR R42 traces prior to Phase A and Ventilation Isolation
- o R-2 OR R-7
- o Containment Pressure
- o Containment Humidity
- o Containment Sump Level
- o Recirculation Sump Level
- o Reactor Cavity Sump Level
- e. CHECK Steam Generator status -NORMAL
  - o R-45
  - o R-49
  - o R-28, R-29, R-30 OR <u>R-3</u>1
  - o Steam Generator level CONTROLLABLE
- e. ISOLATE affected Steam
   Generator per ATTACHMENT 1
   (Isolation of Steam Generator
   Tube Leak/Rupture)

This Step continued on the next page.

| Number: Title:  AOI 4.2.2 LOCA WHEN RCS TEMPERATURE TH              | AT LEAST 200   |
|---|--|
| STEP — ACTION/EXPECTED RESPONSE                                     | RESPONSE NOT OBTAINED  |
| f. Evaluate and operate plant equipment as necessary:               |  |
| o CCW Pumps - 2 RUNNING   |  |
| o Essential SW Pumps -<br>MAINTAINING 53-125 PSIG                   |  |
| o Non-Essential SW Pumps - AT<br>LEAST ONE RUNNING                  |  |
| o EDGs - NOT RUNNING  | o VERIFY FCV-1176 AND<br>FCV-1176A OPEN  |
| o Containment Fan Cooler Units<br>- ALL RUNNING IN INCIDENT<br>MODE | o PERFORM the following  1) START ALL available Fan Cooler Units per SOP 10.3 (Containment Cooling System Operation) |
| o CHECK DC Bus Trouble Alarms<br>- CLEAR                            | o VERIFY MCCs energized  o MCC 24A o MCC 26C o MCC 27A o MCC 29A   |
| o CHECK Battery Bus voltage -<br>NORMAL                             |  |
|   |  |
|   |  |

Number:

A0I 4.2.2

Title:

LOCA WHEN RCS TEMPERATURE AT LEAST 200 °F AND LESS
THAN 350 °F

Revision Number:

REV. 6

STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED

CAUTION

<u>IF</u> offsite power is lost after the SI is RESET. manual action may be required to restart safeguards equipment.

15. RESET SI

a. CHECK SI - ACTUATED

- a. GO TO Step 16
- b. VERIFY Automatic Safeguards Actuation key switches in DEFEAT Panel SB-2)
  - o Train A SIA-1
    - AND -
  - o Train B SIA-2
- c. One at a time, DEPRESS Safety Injection reset buttons (Panel SB-2)
  - o Train A
  - o Train B
- d. VERIFY SI Train A AND <u>Tra</u>in B RESET
- d. VERIFY relays reset (Top of Safeguards Initiation Tacks 1-1 AND 1-2):
  - o SAI-1
  - o SIM-1
  - o SIA-2
  - o SIM-2

STEP -

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

- 16. <u>RESET Containment Isolation</u>
  Phase A
  - a. PLACE IVSW switches to OPEN (Panel SN)
    - o 1410
    - o 1413
    - o SOV-3518
    - o SOV-3519
  - PLACE CNTMT RAD MON WCPS VALVES control switch to OPEN (Panel SN)
  - PLACE personnel AND equipment hatch solenoid control switches to INCIDENT (Panel SM)
  - d. PLACE control switches for all remaining Phase A isolation valves to CLOSE (Panel SN)
  - e. One at a time. DEPRESS Phase A reset buttons
    - o CI Phase A Train A
    - o CI Phase A Train B

This Step continued on the next page.