**FIRE PROTECTION BASELINE INSPECTION**
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**INPUT FOR INSPECTION REPORT NO.:** 50-400/2002-011

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**INSPECTION DATES:**

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**Type of Inspection: TRIENNIAL FIRE PROTECTION BASELINE INSPECTION:** Fire Protection Features and Post-Fire Safe Shutdown Capability

A. INSPECTION REPORT INPUT

**1. REACTOR SAFETY**
**Cornerstones: Initiating Events, Mitigating Systems**

1R05 FIRE PROTECTION (71111.05)

.04 Operational Implementation of SSD Capability

The guidelines established by BTP CMEB 9.5-1, Section C.5.b, "Safe Shutdown Capability," paragraph (1), required that SSCs important to safe shutdown be provided with fire protection features capable of limiting fire damage to ensure that one train of systems necessary to achieve and maintain hot shutdown conditions remained free of fire damage. Options for providing this level of fire protection were delineated in BTP CMEB 9.5-1, Section C.5.b, "Safe Shutdown Capability," paragraph (2). Where the protection of systems whose function was required for hot shutdown did not satisfy BTP CMEB 9.5-1, Section C.5.b, paragraph (2), an alternative or dedicated shutdown capability and its associated circuits, was required to be provided that was independent of the cables, systems, and components in the area. For such areas, BTP CMEB 9.5-1, Section C.5.c, "Alternative or Dedicated Shutdown Capability," paragraph (3), specifically required the alternative or dedicated shutdown capability to be physically and electrically independent of the specific fire areas and capable of accommodating post-fire conditions where offsite power was available and where offsite power was not available for 72 hours. BTP CMEB 9.5-1, Section C.5.f, "Ventilation," required that products of combustion and the means by which they will be removed from each fire area be established to ensure that smoke and corrosive gases will not affect SSD areas.

a. Inspection Scope

For fires in fire areas 1-A-BAL, Fire Zones 1-A-4-CHLR and 1-A-4-COM-E, 1-A-EPA, 1-A-BATB, and 1-A-ACP, the team walked down the manual actions described in procedure AOP-036, Safe Shutdown Following a Fire, to verify that:

- The procedures used for SSD were available to the appropriate staff.
- The procedures used for SSD were consistent with the SSA methodology and assumptions.
- The procedures were written so that operator actions could be correctly performed within the times assumed in the SSA.
- The training program for operators included SSD capability for a fire event.
- Personnel required to achieve and maintain the plant in hot shutdown condition from the MCR could be provided from normal onsite staff, exclusive of the fire brigade.
- Operators had sufficient access to the equipment to perform the required actions.

For each of these manual actions, the team reviewed fire-protection-related licensing-basis documents, to verify that these actions were described in those documents.

The team also reviewed:

- operator and fire brigade staffing, to verify that shift staffing would be adequate to complete the required manual actions, and
- selected fire fighting pre-plan procedures and heating ventilation and air conditioning (HVAC) systems, to verify that access to remote shutdown equipment and operator manual actions would not be inhibited by smoke migration from one area to adjacent plant areas used to accomplish SSD.

In addition, the team reviewed operator training lesson plans and job performance measures (JPMs) and discussed the training with operators, to verify that SSD activities had been appropriately included in the training program.

b. Findings

(1) RELIANCE ON MANUAL ACTIONS

Introduction

An unresolved item was identified for excessive reliance on manual actions to establish and maintain SSD in case of a fire, instead of physically protecting cables from fire damage. (no approved deviations)

Description

Analysis

Enforcement

(2) INADEQUATE SAFE SHUTDOWN PROCEDURE

Introduction: A Green non-cited violation of TS 6.8.1 with two examples was identified for failure to establish an adequate written procedure covering fire protection program implementation, in that the licensee's procedure for safe shutdown following a fire describes manual actions that cannot reasonably be completed by some NLOs.

Description: The team identified several actions required by AOP-036 that could not reasonably be completed by all SSD NLOs. Those actions and the challenges associated with those actions are described below.

For a fire in Fire Area 1-A-ACP, AOP-36 steps 2.c and 14.a required the NLO to remove fuses from transfer panel 1B. Completing these steps would include overcoming the following challenges:

- The subject transfer panel was physically located approximately 20 feet from the ACP room door. With a fire in the ACP room, the area around the transfer panel could become uninhabitable before the NLO could complete these steps, because some smoke from the fire could enter the transfer panel area from around the door while the door is closed, and because smoke would certainly enter the transfer panel area when the door is opened by the fire brigade to attack the fire.

- To physically reach the subject fuses, the NLO would necessarily place his or her entire body inside a cabinet with a central access area that is approximately 15 inches wide. The licensee had not ensured that all NLOs were physically capable of entering that cabinet.

- Because the subject fuses were located on a panel approximately seven feet above floor level, to physically reach the subject fuses, all but the tallest NLOs would necessarily use a narrow, custom-made wooden step-stool to step up to the shield. The team noted that the location of the step-stool was not controlled.

- Because the subject fuses were also located behind a plexiglass fuse cover that was held in place by small screws, to physically reach the subject fuses, the NLO would necessarily raise his or her hands above the level of his or her head, and use a metal screwdriver to remove the fuse cover. The licensee had not ensured that all NLOs were physically capable of completing this activity. Furthermore, because this activity involves manipulating a metal screwdriver inside an energized electrical cabinet, the team considered this activity to involve a personnel safety hazard.

- To identify the correct fuses to be pulled, the NLO must first identify the cabinet in which the fuses are located, and then identify the fuses themselves, within that cabinet. The team observed that the subject cabinet was physically adjacent to 4 identical cabinets, that these cabinets were not labeled on the side from which the NLO would enter, and that the instructions in AOP-036 did not identify the subject cabinet. Furthermore, the team observed that the labels which uniquely identify the

subject fuses within the cabinet were partially obscured by cables which had been landed on adjacent terminal blocks.

For a fire in Fire Area 1-A-BATB (Battery Room B,) AOP-036 steps 1.a through 1.d provided guidance for responding to spurious opening of the RHR containment recirc sump suction valves. Opening both train A (1SI-300 and 1SI-310) or both train B (1SI-301 and 1SI-311) sump suction valves would result in the RWST draining down to the sumps through normally open RWST to RHR supply valves 1SI-322 (train A) or 1SI-323 (train B). The team determined that during a fire in Battery Room B, only train B cables would be affected. Therefore, train B containment recirc sump suction valves would be the valves of concern. The train A valves would be unaffected and remain closed.

Step 1.a directed the operator to shut and de-energize both RWST to RHR supply valves (to A and B RHR Pumps, respectively) to immediately stop the RWST drain down. The team noted that because only train B would be the affected, only supply valve 1SI-323 would need to be shut to halt the drain down. Because the train A sump suction valves would still be shut, shutting 1SI-322 would isolate all water suction sources to the A RHR Pump.

Step 1.b provided guidance to refill the RWST with the A RHR Pump from the containment emergency sump. None of the actions listed in step 1.b direct opening the sump isolation valves. Because the A RHR Pump has no suction flow path, the RWST would not be refilled using this step. The pump recirc line would prevent pump damage provided prompt operator action to diagnose the improper system response.

Similarly, for a fire in Fire Area 1-A-EPA, the team found the above procedure deficiencies were repeated but for the opposite train of RHR (train A cables are exposed in this fire area). The team also noted that the licensee had identified valves 1SI-322 and 1SI-300 as contaminated and had wrapped these valves in yellow polyethylene plastic for contamination control. However, there was no anti-contamination clothing, step-off pad or portable radiation monitor pre-staged at this location to allow the SSD NLO to quickly manipulate either valve in emergency conditions. Additionally, the local valve position indication for each valve was covered by the yellow polyethylene plastic which would have precluded an NLO from visually verifying valve position from outside the contamination control area.

Because of these challenges, the team considered that not all NLOs could reasonably be expected to successfully complete the manual actions described in these steps.

LATER: inadequate corrective action for the previous White finding on the ACP room Thermo-Lag wall?

LATER: other examples?

Analysis This violation was more than minor because it affected the objectives of the Mitigating Systems cornerstone, in that this violation could affect the availability of systems that respond to fire events to prevent undesirable consequences. The safety significance of this violation was very low, because the fire initiation frequency in the corresponding area is very low, and because failure to remove the subject fuses would

potentially disable only the turbine-driven auxiliary feedwater pump; all other mitigation capabilities would not be affected.

Enforcement TS 6.8.1 requires, in part, that written procedures shall be established, implemented, and maintained covering fire protection program implementation. By reference, FSAR section 9.5.1 incorporates into the FSAR, the licensee's Safe Shutdown Analysis in Case of Fire (calculation E-5525). In E-5525, Revision 6, Section VI.B describes the methodology through which manual actions were identified, and Attachment D lists the manual actions that may need to be taken if safe shutdown components are damaged as a result of a fire. Those manual actions are incorporated into AOP-036.

Contrary to the above, the licensee failed to establish an adequate written procedure covering fire protection program implementation, in that in Attachment 1 of procedure AOP-036, Safe Shutdown Following a Fire, steps 2.c and 4 of the Safe Shutdown Manual Operations for fire area 1-A-ACP describe manual actions which cannot reasonably be completed by some NLOs. Because this failure to implement an adequate procedure is of very low safety significance and has been entered into the CAP (AR 80214), this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy: NCV 50-400/02-11-XX

(3) INADEQUATE PROCEDURE (inadequate staffing)

Introduction A Green non-cited violation of TS 6.8.1 was identified for failure to establish an adequate written procedure covering fire protection program implementation, in that the licensee's procedure for safe shutdown following a fire describes more manual actions than can reasonably be completed by normal onsite staff.

Description: The team found that for each fire area inspected, AOP-036 required operators to complete a relatively large number of manual actions outside the main control room. The team determined that the normal shift operating crew included four non-licensed operators (NLOs). Three NLOs were assigned to the fire brigade and one NLO was assigned to support safe shutdown manual actions (SSD NLO). The table below shows, for each fire area reviewed during this inspection, the number of manual actions required by AOP-036 to be completed outside the main control room to achieve hot standby conditions.

| | Number of manual actions | |
|---|---|---|
| Fire Area / Zone | In AOP-036 | In other procedures* |
| Generic Steps for All Fire Areas | 10 | Many. Depends on decisions made by the operating crew. |
| 1-A-BAL-B | 29 | LATER |
| 1-A-BATB | 14 | LATER |
| 1-A-EPA | 14 | LATER |

| | Number of manual actions | |
|---|---|---|
| Fire Area / Zone | In AOP-036 | In other procedures* |
| 1-A-ACP | 27 | 18 |

* Numbers in this column show how many manual actions were described in procedures that were called out by AOP-036.

The specific local manual operator actions evaluated by the team for each of these fire areas are listed in Attachment 1.

The team found that while most of the manual actions in these areas involved one-time actions (like opening a breaker), others could require the NLO to monitor plant conditions and make system adjustments over an extended period of time. The manual actions which could require dedicated NLO attention, and thus possibly detract from the successful and timely performance of subsequent required local manual operator actions, include the following:

- In Section 3.0 of AOP-036, Step 13.b(3) requires the NLO to establish continuous communications with the MCR, locally shut 1CS-228 to isolate the normal charging flow control valve (FCV) and then to locally control charging flow by throttling the bypass valve, 1CS-227. Both valves are in close proximity and located in the scalloped area of the 248-ft level in the reactor auxiliary building (RAB). This area is located in the radiation-controlled area (RCA) and radiation levels at these valves are elevated but within 10 CFR 20 limits. A sound powered phone with a long extension cord is located in the area to allow the NLO to wait in low dose areas between valve manipulations if the NLO's radio is not functional. However, local manual operator actions subsequent to this step could be adversely impacted (e.g., Section 3.0, Step 14.b for locally responding to a failed open steam generator PORV).

- In Attachment 1 of AOP-036, Step 13.c for fire area 1-A-ACP requires the NLO to locally operate a PORV on the C steam generator, to obtain and maintain the desired RCS temperature. Because the unit will likely not be at steady state when this action is undertaken, and because a fire in this area may complicate operator efforts to stabilize the plant, the NLO who undertakes this action may be required to monitor RCS temperature and make appropriate adjustments to the PORV position almost continuously and for some time, until the plant is reasonably stable.

- In Attachment 1 of AOP-036, Step 14.b for fire area 1-A-ACP requires the NLO to throttle 1AF-149 to maintain level in the C steam generator. For the same reasons as described above, the NLO who undertakes this action may be required to continue to monitor steam-generator level and make appropriate adjustments to the position of 1AF-149 almost continuously and for some time, until the plant is reasonably stable.

The team found that some of the required manual actions would be completed inside the RCA, while others would be completed outside the RCA. The team also observed that completing the manual actions in AOP-036, in the order in which they are described

in that procedure, would require the SSD NLO to enter and exit the RCA several times. The team noted that:

- some manual actions involved valves identified as potentially contaminated or located in contamination areas,
- radioactive radon gas can become associated with anyone who passes through the RCA,
- hand or foot contamination as well as radon gas can cause a portal monitor to alarm, and
- anyone who is in a portal monitor when it alarms must wait at the exit point for health physics (HP) technicians to complete a detailed survey to determine the true cause of the alarm, before proceeding.

The team noted that the licensee had no emergency dosimeters or rapid ingress/egress procedures in place for use during plant emergency situations. The team therefore considered that every time the SSD NLO exited the RCA, that NLO may experience a portal-monitor alarm, and may therefore be forced to wait for HP technicians to arrive at the exit and complete a detailed survey before proceeding.

The team considered that the manual actions in AOP-036 could not reasonably be completed by the available staff, because:

- the SSD NLO may be required to complete as many as 39 manual actions,
- several manual actions require dedicated operator attention,
- some of the manual actions could require a considerable amount of time to complete,
- completing some manual actions could be delayed by RCA portal-monitor alarms, and
- only one NLO would have been available to complete all safe-shutdown manual actions.

The team therefore considered that procedure to be inadequate.

Analysis: This violation was more than minor because it affected the objectives of the Mitigating Systems cornerstone, in that this violation could affect the availability of systems that respond to fire events to prevent undesirable consequences. The safety significance of this violation was very low, because the fire initiation frequency in the corresponding area is very low.

Enforcement TS 6.8.1 requires, in part, that written procedures shall be established, implemented, and maintained covering fire protection program implementation. By reference, FSAR section 9.5.1 incorporates into the FSAR, the licensee's Safe Shutdown Analysis in Case of Fire (calculation E-5525). In E-5525, Revision 6, Section

VI.B describes the methodology through which manual actions were identified, and Attachment D lists the manual actions that may need to be taken if safe shutdown components are damaged as a result of a fire. Those manual actions are incorporated into AOP-036.

Contrary to the above, the licensee failed to establish a written procedure covering fire protection program implementation, in that in Attachment 1 of procedure AOP-036, Safe Shutdown Following a Fire, the Safe Shutdown Manual Operations for fire area 1-A-ACP describe too many manual actions for the available staff to complete. Because this failure to implement an adequate procedure is of very low safety significance and has been entered into the CAP (AR 80215), this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy: NCV 50-400/02-11-XX

.07 Emergency Lighting

The guidelines established by BTP CMEB 9.5-1, Section C.5.g, "Lighting and Communication," paragraph (1), required that fixed self-contained lighting consisting of fluorescent or sealed-beam units with individual eight hour minimum battery power supplies should be provided in areas that must be manned for safe shutdown and for access and egress routes to and from all fire areas.

a. Inspection Scope

The team reviewed the design and operation of, and examined the manufacturer's information for the direct current (DC) emergency lighting system self-contained, battery powered units (ELUs) as described in UFSAR Sections 9.5.1.2.2.e and 9.5.3. During plant walk downs of selected areas where operators performed local manual actions defined in the post-fire SSD procedure, the team inspected area emergency lighting units (ELUs) for operability and checked the aiming of lamp heads to determine if adequate illumination was available to correctly and safely perform the actions required by the procedures. The team inspected emergency lighting features along access and egress pathways used during SSD activities for adequacy and personnel safety. The locations and identification numbers on the ELUs were compared to design drawings to confirm the as-built configuration. The team also checked if these battery power supplies were rated with at least an 8-hour capacity. In addition, the team reviewed licensee periodic maintenance tests to verify that the ELUs were being maintained in an operable manner.

b. Findings

Introduction A violation was identified for failure to provide fixed, self-contained lighting with individual eight-hour-minimum battery power supplies in areas that must be manned for safe shutdown.

Description In the areas in which the team walked down safe shutdown manual actions, the team identified that the local manual operator actions listed in Attachment 2 would not be illuminated by fixed, self-contained lighting with individual eight-hour-minimum battery power supplies.

The team determined that the licensee had not requested exemptions from the requirement to provide such lighting.

Analysis The team determined that this violation was more than minor because it affected the objectives of the Mitigating Systems cornerstone, in that this violation could affect the availability of systems that respond to fire events to prevent undesirable consequences.

The team noted that the fire initiation frequency in the ACP room was LATER. The team reviewed site lighting drawings, and found that the manual actions listed in Attachment 3 were in the vicinity of flourescent lighting that would be powered from a diesel generator during a SSD scenario.

The team considered the risk significance of this violation to be very low, because the fire initiation frequency in this area is low, and because NLOs routinely carry flashlights that could be used to illuminate the areas in which the actions must be completed.

Enforcement FSAR section 9.5.1 states that Branch Technical Position (BTP) 9.5-1 is used in the design of the fire protection program for safety-related systems and equipment and for other plant areas containing fire hazards that could adversely affect safety-related systems. BTP 9.5-1, Section C.5.g, "Lighting and Communication," paragraph (1), required that fixed self-contained lighting consisting of fluorescent or sealed-beam units with individual eight-hour-minimum battery power supplies should be provided in areas that must be manned for safe shutdown and for access and egress routes to and from all fire areas.

Contrary to the above, the licensee failed to provide fixed self-contained lighting consisting of fluorescent or sealed-beam units with individual eight-hour-minimum battery power supplies in the vicinity of the components associated with the following manual actions identified above. Because this failure to provide the subject lighting is of very low safety significance and has been entered into the CAP (AR 79047), this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy: NCV 50-400/02-11-XX

## List of Inspection Documents Reviewed

## PROCEDURES

AOP-036, Safe Shutdown Following a Fire, Rev. 21
AOP-038, Rapid Downpower, Rev. 2
EOP-EPP-004, Reactor Trip Response, Rev. 10
EOP-Guide-1, Path 1 Guide, Rev. 14
MST-I0277, Electrical Power Feed Switchover for RHR Inlet Isolation Valve 1RH-1 (1RH-V502SB-1)
OP-110, Section 8.3, Venting the SI Accumulators, Rev. 18

## JOB PERFORMANCE MEASURES (JPMs) AND LESSON PLANS

## LOCAL MANUAL OPERATOR ACTION STEPS REVIEWED FOR ACHIEVING HOT STANDBY

Summary of Number of Local Manual Action Steps to be Performed Outside of the Control Room to Achieve and Maintain Hot Standby

| | Number of Manual Action Steps | | |
|---|---|---|---|
| Fire Area / Zone | Generic Steps in AOP-36 for All Fire Areas | Area Specific Steps in AOP-036 and Other Procedures Referenced by AOP-36 | Total Steps by Fire Area/Zone |
| 1-A-BAL-B | 10 | 29 | 39 |
| 1-A-BATB | 10 | 14 | 24 |
| 1-A-EPA | 10 | 14 | 24 |
| 1-A-ACP | 10 | 45 | 55 |

Listing of AOP-036 Manual Action Steps Reviewed for Safe Shutdown Following a Fire

| **Section 3.0 Actions (Generic Steps for All Fire Areas/Zones):** | |
|---|---|
| Step 12.c RNO | **MONITOR** AFW pump suction pressure indicators as an alternative to CST level indication: (Refer to Attachment 4, AFW Suction Pressure vs. CST level)<br>• PI-2271 (at TDAFW Pump) |
| Step 13.b(3) | **Locally PERFORM** the following (248' RAB):<br>(a) **SHUT** 1CS-228, Normal Charging FCV Inlet Isolation Valve.<br>(b) **THROTTLE** 1CS-227, Normal Charging FCV Bypass, as necessary to control charging flow. |
| Step 13.c RNO | **ESTABLISH** flow through the Hi Head SI Line, as follows:<br>(1).....*(MCR action)*<br>(2).....*(MCR action)*<br>(3) **OPEN** ONE of the following breakers:<br>• 1B31-SB 4C, 1SI-3 BIT Outlet<br>• 1A31-SA 4C, 1SI-4 BIT Outlet<br>(4) **WHEN** directed by MCR, **THEN locally THROTTLE** the de-energized valve to maintain PRZ level: |

| | |
|---|---|
| | • 1SI-3, BIT Outlet Isolation<br>• 1SI-4, BIT Outlet Isolation |
| Step14.b | **UNLOCK and SHUT** the affected manual block valve(s): (Steam Tunnel Platform El. 280)<br>• 1MS-59, SG A PORV Manual Block<br>• 1MS-61, SG B PORV Manual Block<br>• 1MS-63, SG C PORV Manual Block |

| **AOP-36 Attachment 1 (Area Specific) Actions For Fire Area: 1-A-BATB:** | |
|---|---|
| Step 1 | **IF** RHR suction valves spuriously open resulting in RWST drain down, **THEN PERFORM** the following recommended actions, as required: |
| Step 1.a | **ISOLATE** the Containment Recirc Sumps from the RWST, as follows:<br>(1) **SHUT** the following valves:<br>• 1SI-322, RWST To RHR Pump A-SA (RAB 286)<br>• 1SI-323, RWST To RHR Pump B-SB (RAB 286)<br>(2) **DE-ENERGIZE** the following valves:<br>• 1SI-322 at breaker 1A31-SA-6E (RAB 286)<br>• 1SI-323 at breaker 1B31-SB-6E (RAB 286) |
| Step 1.b | **REFILL** the RWST with A RHR Pump, as follows:<br>(1) **SHUT** 1SI-327, Low Head SI Train B to Hot Leg Crossover Isol Vlv.<br>(2) **OPEN** the following valves to align RHR HX outlet flow to the RWST:<br>• 1SI-448, Low Head SI Recirc to RWST Root Isol Vlv<br>• 1SI-331, Low Head SI Recirc to RWST Isol Vlv<br>(3) **USE** the RHR Pump as needed. |
| Step 1.d | **WHEN** RHR Pumps are no longer required to fill the RWST, **THEN:**<br>(1) **SHUT** the following valves to isolate RHR HX outlet flow from the RWST:<br>• 1SI-448, Low Head SI Recirc to RWST Root Isol Vlv<br>• 1SI-331, Low Head SI Recirc to RWST Isol Vlv<br>(2) **OPEN** 1SI-327, Low Head SI Train B to Hot Leg Crossover Isol Vlv. |
| Step 2 | **PERFORM** the following to prevent spurious valve opening: |

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|---|---|
| Step 2.a | **VERIFY** the following valves are SHUT:<br>• 1SI-301, CV Sump 1B To RHR Pmp 1B-SB CIV (RAB 286)<br>• 1SI-311, CV Sump 1B To RHR Pmp 1B-SB Downstrm Iso Vlv (RAB 286) |
| Step 2.b | **DE-ENERGIZE** the following valves:<br>• 1SI-301 at breaker 1B21-SB-11B (RAB 286)<br>• 1SI-311 at breaker 1B21-SB-7A (RAB 286) |

| **AOP-36 Attachment 1 (Area Specific) Actions For Fire Area: 1-A-EPA:** | |
|---|---|
| Step 7 | **IF** RHR suction valves spuriously open resulting in RWST drain down,<br>**THEN PERFORM** the following recommended actions, as required: |
| Step 7.a | **ISOLATE** the Containment Recirc Sumps from the RWST, as follows:<br>(1) **SHUT** the following valves:<br>• 1SI-322, RWST To RHR Pump A-SA (RAB 286)<br>• 1SI-323, RWST To RHR Pump B-SB (RAB 286)<br>(2) **DE-ENERGIZE** the following valves:<br>• 1SI-322 at breaker 1A31-SA-6E (RAB 286)<br>• 1SI-323 at breaker 1B31-SB-6E (RAB 286) |
| Step 7.b | **REFILL** the RWST with B RHR Pump, as follows:<br>(1) **SHUT** 1SI-326, Low Head SI Train A to Hot Leg Cross-over Isol Vlv.<br>(2) **OPEN** the following valves to align RHR HX outlet flow to the RWST:<br>• 1SI-448, Low Head SI Recirc to RWST Root Isol Vlv<br>• 1SI-331, Low Head SI Recirc to RWST Isol Vlv<br>(3) **USE** the RHR Pump as needed. |
| Step 7.c | **IF** charging is required in the interim,<br>**THEN USE** the Boric Acid Tanks. |
| Step 7.d | **WHEN** RHR Pumps are no longer required to fill the RWST,<br>**THEN:**<br>(1) **SHUT** the following valves to isolate RHR HX outlet flow from the RWST:<br>• 1SI-448, Low Head SI Recirc to RWST Root Isol Vlv<br>• 1SI-331, Low Head SI Recirc to RWST Isol Vlv<br>(2) **OPEN** 1SI-326, Low Head SI Train A to Hot Leg Cross-over Isol Vlv. |

| | |
|---|---|
| Step 8 | **PERFORM** the following to prevent spurious valve opening: |
| Step 8.a | **VERIFY** the following valves are SHUT:<br>• 1SI-300, CV Sump 1A To RHR Pmp 1A-SA CIV (RAB 286)<br>• 1SI-310, CV Sump 1A To RHR Pmp 1A-SA Downstrm Iso Vlv (RAB 286) |
| Step 8.b | **DE-ENERGIZE** the following valves:<br>• 1SI-300 at breaker 1A21-SA-7C (RAB 286)<br>• 1SI-310 at breaker 1A21-SA-9B (RAB 286) |

| **AOP-36 Attachment 1 (Area Specific) Actions for Fire Area 1-A-BAL:** | |
|---|---|
| Step 1 | **PERFORM** the following to prevent spurious valve operations: |
| Step 1.a | **VERIFY** the following valves are OPEN<br>• 1CS-214, Charging/SI Pumps Miniflow Isol (RAB 236 near Boric Acid Pumps)<br>• 1CS-169, CSIP Suction Header Xconn (RAB 247 above CSIPs)<br>• 1CS-218, CSIP Discharge Header Xconn (RAB 247 above CSIPs)<br>• 1CC-252, CCW From RCP Thermal Barrier FCV (RAB 236 Scalloped Area) |
| Step 1.b | **DE-ENERGIZE** the following valves:<br>• 1CS-214 at breaker 1A35-SA-4C (RAB 261)<br>• 1CS-169 at breaker 1A35-SA-4B (RAB 261)<br>• 1CS-218 at breaker 1B35-SB-14D (RAB 261)<br>• 1CC-252 at breaker 1E12-6B (RAB 261) |
| Step 5 | **CAUTION**<br>• The following step will inhibit all automatic and manual safeguards functions since a fire in this area could cause spurious actuations as well as disable controls for resetting SI.<br>• Removal of Output Relay Power Fuses from both trains of SSPS will generate a Reactor Trip signal. The Reactor should be shut down prior to performing the following step. |

| | |
|---|---|
| | **OBTAIN** SSPS Key 96<br>AND **DEFEAT** both trains of SSPS by removing the listed fuses in the front of the listed SSPS Output Cabinets:<br>• Train A, Output Cabinet No. 1, Output Relay Power fuses<br>• Train A, Output Cabinet No. 2, fuses 61 and 62<br>• Train B, Output Cabinet No. 1, Output Relay Power fuses<br>• Train B, Output Cabinet No. 2, fuses 61 and 62 |
| Step 20 | **IF** the following valves cannot be shut due to fire damage to their control cables,<br>• 1CS-165, VCT Outlet/Dilution FCV (1-LCV-115C)<br>• 1CS-166, VCT Outlet (1-LCV-115E)<br>**THEN:** |
| Step 20.a | **STOP** ALL CSIPs. |
| Step 20.b | **SHUT** EITHER of the following valves:<br>• 1CS-170, A CSIP Suction X-conn<br>• 1CS-168, C CSIP Suction X-conn with A CSIP |
| Step 20.c | **SHUT** EITHER of the following valves:<br>• 1CS-169, C CSIP Suction X-conn with B CSIP<br>• 1CS-171, B CSIP Suction X-conn |
| Step 20.d | **VERIFY SHUT**.1CS-214, Charging/SI Pumps Miniflow Isol. |
| Step 21 | **IF** BOTH of the following occur due to fire damage to their control cables:<br>• 1SW-270, ESW Header A Return to Aux Reservoir, spuriously SHUTS<br>• 1SW-276, ESW to NSW Discharge HDR, spuriously OPENS<br>**THEN ALIGN** flow to the cooling tower, as follows: |
| Step 21.a | **VERIFY OPEN** 1SW-275, ESW Return Header A to NSW. |
| Step 21.b | **WHEN** time permits,<br>**THEN:**<br>**(1) DE-ENERGIZE** 1SW-270, ESW Header A Return to Aux Reservoir, at breaker 1A35-SA-9C (RAB 261).<br>**(2) OPEN** 1SW-270 locally (RAB 261).<br>**(3) WHEN** 1SW-270 is open,<br>**THEN SHUT** 1SW-276, ESW to NSW Discharge Hdr. |

| | |
|---|---|
| Step 22 | **IF** BOTH 1SW-270 AND 1SW-276 shut,<br>**THEN CROSS-CONNECT** ESW Discharge Headers as follows: |
| Step 22.a | **VERIFY OPEN** 1SW-274, ESW Return Header B to NSW. |
| Step 22.b | **VERIFY OPEN** 1SW-275, ESW Return Header A to NSW. |
| Step 22.c | **VERIFY OPEN** 1SW-271, ESW Header B Return to Aux Reservoir. |
| Step 22.d | **WHEN** time permits,<br>**THEN:**<br>**(1) DE-ENERGIZE** 1SW-270, ESW Header A Return to Aux Reservoir, at breaker 1A35-SA-9C (RAB 261).<br>**(2) OPEN** 1SW-270 locally (RAB 261).<br>**(3) WHEN** 1SW-270 has been opened,<br>**THEN SHUT** 1SW-274, ESW Return Header B to NSW. |

| **AOP-36 Attachment 1 (Area Specific) Actions for Fire Area 1-A-ACP:** | | |
|---|---|---|
| Step 1b | SECURE Rod Drive MG sets using OP-104, Rod Control System | |
| | OP-104 Step Number | Description |
| | 7.3.2.02 | Place GENERATOR CIRCUIT BREAKER CONTROL switch 1A to TRIP |
| | 7.3.2.03 | Place MOTOR CIRCUIT BREAKER CONTROL switch 1A to TRIP |
| | 7.3.2.04 | Open Reactor Trip Breakers, if not already open. |
| | 7.3.2.05 | Place GENERATOR CIRCUIT BREAKER CONTROL switch 1B to TRIP |
| | | Place MOTOR CIRCUIT BREAKER CONTROL switch 1B to TRIP |
| Step 2 | If BOTH MDAFW pumps are disabled, THEN: | |

| | | |
|---|---|---|
| Step 2c | Obtain a transfer panel key 33, 34, 35, 36, 99 or 106 (MCR or ACP key locker)... | |
| | ... and de-energize the TDAFW Pump Trip and Throttle Valve by removing fuses 1A-11/1976 and 1A-12/1976 | |
| Step 2d | De-energize 1MS-70 by opening disconnect switch on DP-1A2-SA-2B. | |
| Step 2f | IF TDAFW Pump is NOT operating properly, THEN locally... | |
| | ...VERIFY OPEN TDAFW Pump Trip and Throttle Valve | |
| | ...VERIFY OPEN 1MS-70, Main Steam B to Aux FW Turbine | |
| Step 2g | IF MCB CST level indication is NOT available, | |
| | THEN locally monitor AFW pump suction pressure using Attachment 4. | |
| Step 4 | REMOVE the fuse for 1BD-30 SA at panel ARP-19A | |
| | REMOVE the fuse for 1BD-49 SA at panel ARP-19A | |
| Step 6 | OPEN the power supply breaker for 1CS-235 at breaker 1B31-SB-10A | |
| Step 7 | ISOLATE AND VENT IA to 1CH-279 | |
| Step 7a | SHUT "1IA-871-I1" | |
| Step 7b | OPEN air filter drain petcocks on Instrument Air Filter | |
| Step 7c | CHECK 1CH-279, AH-12 1ASA valve OPEN | |
| Step 8 | OPEN the power supply breaker for 1CS-171 at breaker 1B35-SB-4D | |
| Step 9 | Locally VERIFY OPEN 1CS-171, B CSIP Suction X-Conn valve | |
| | Locally VERIFY OPEN 1CS-235, Charging Line Isolation valve | |
| Step 10 | Locally verify shut 1BD-30, SG 1B Blowdown Isolation valve | |
| | Locally verify shut 1BD-49, SG 1C Blowdown Isolation valve | |
| Step 13 | IF SG C PORV cycles erroneously, THEN: | |
| Step 13c | IF SG C PORV manual/automatic station does <u>not</u> function properly, | |
| | THEN locally OPERATE SG C PORV using OP-126 for desired cooldown rate. | |
| | OP-126 <u>Step Number</u> | <u>Description</u> |
| | 8.2.1.2.01 | Obtain pliers, flashlight, head set, extension cord |

| | | |
|---|---|---|
| | 8.2.1.2.02 | Open Servo Valve Solenoid feeder breaker PP-1A312-SA-3 |
| | | Open Servo Valve Solenoid feeder breaker PP-1B312-SB-3 |
| | | Open Servo Valve Solenoid feeder breaker IDP-1A-SIII-11 |
| | 8.2.1.2.03 | Remove the cover from the side of the PORV |
| | 8.2.1.2.04 | Establish communications with the Control Room |
| | 8.2.1.2.07 | To throttle open the PORV, |
| | 8.2.1.2.07a | Rotate Solenoid B manual override approximately 3/4 turn in the clockwise direction |
| | 8.2.1.2.07b | As directed by the Control Room, slowly rotate Solenoid A manual override approximately 3/4 turn in the clockwise direction |
| | 8.2.1.2.07c | When the PORV is at its desired position, place Solenoid A manual override back to its original position |
| | 8.2.1.2.08 | To partially shut the PORV, |
| | 8.2.1.2.08a | Check Solenoid A manual override in the fully counterclockwise position. |
| | 8.2.1.2.08b | As directed by the Control Room slowly rotate Solenoid B manual override to its original position by rotating it approximately 3/4 turn in the counterclockwise direction, until the PORV starts to shut. |
| | 8.2.1.2.08c | When the PORV is at the desired position, rotate Solenoid B manual override approximately 3/4 turn in the clockwise direction. |
| Step 14 | IF FCV-2071C, Aux FW C Regulator 1AF-131, spuriously CLOSES, THEN | |
| Step 14a | REMOVE fuse 1A-5/1952 at Transfer Panel 1B | |
| Step 14b | THROTTLE 1AF-149, Stm Turb Aux FW C Isolation, to maintain SG C level | |

| **AOP-36 Attachment 2 Actions For SSD 1 Equipment Powered by SSD 2:** | |
|---|---|
| Step 2 | **IF** control power is lost to 1CS-231, Charging Flow controller, |

| | |
|---|---|
| | **THEN PERFORM** the following locally: |
| Step 2.a | **SHUT** 1CS-228, Normal Charging FCV Inlet Isolation Valve. |
| Step 2.b | **MAINTAIN** 25% to 60% PRZ level (charging flow) using 1CS-227, Normal Charging FCV Bypass. |

| **AOP-36 Attachment 3 Actions For SSD 2 Equipment Powered by SSD 1:** | |
|---|---|
| | This attachment was reviewed but contained no hot standby local manual operator actions. |

**LOCAL MANUAL OPERATOR ACTION STEPS**
**REVIEWED FOR ACHIEVING COLD SHUTDOWN**

AOP-036
(Safe Shutdown Following a Fire, Rev. 21)

| **Attachment 1, SSD Emergency Manual Operations:** Fire Area: 1-A-EPA | |
|---|---|
| Step 4.b | **WHEN** manpower is available,<br>**THEN:**<br>**(1) DE-ENERGIZE** the following valves:<br>• 1SI-246, SI Accumulator A Discharge, at breaker 1A21-SA-5C<br>• 1SI-248, SI Accumulator C Discharge, at breaker 1A21-SA-3D |

| **Attachment 2, SSD 1 Equipment Powered by SSD 2:** | |
|---|---|
| Step 6 | **IF** 1RH-30, RHR Heat Xchg A Out Flow Cont, **OR** 1RH-20, RHR Hx Xchg A Byp Flow Cont, cannot be controlled due to loss of control power,<br>**THEN:** |
| Step 6.a | **ISOLATE** 1RH-20 air supply, 1IA-128-I2, to cause it to fail closed. |
| Step 6.d | **VERIFY** RHR is cooling the RCS by trending temperature using ONE of the following methods:<br><br>• *.....(MCR action)*<br>• Local temperature indication TI-5551A (RHR Heat Exchanger Outlet) |

Attachment 2

## MANUAL ACTIONS DESCRIBED IN AOP-036 WITHOUT REQUIRED LIGHTING

**Section 3.0, for All Fire Areas**

| Step # | Description |
|---|---|
| 13.a(7) | Open 1CS-526, BA Tk Supply to CSIP Isol. Vlv. |

**Attachment 1, for Fire Area 1-A-ACP**

| Step # | Description |
|---|---|
| 1.b | Secure Rod Drive MG sets using OP-104, Rod Control System |
| 2.c | Obtain a transfer panel key 33, 34, 35, 36, 99 or 106 (MCR or ACP key locker) and de-energize the TDAFW Pump Trip and Throttle Valve by removing 2 fuses |
| 2.d | De-energize 1MS-70 by opening disconnect switch on DP-1A2-SA-2B. |
| 2.f | Locally verify open TDAFW Pump Trip and Throttle Valve and 1MS-70, Main Steam B to Aux FW Turbine |
| 2.g | Locally monitor AFW pump suction pressure |
| 4 | Remove the fuses for 1BD-30 SA and 1BD-49 SA at panel ARP-19A |
| 6 | Open the power supply breaker for 1CS-235 at breaker 1B31-SB-10A |
| 9 | Locally verify open 1CS-235 |
| 14.a | Remove fuse 1A-5/1952 at Transfer Panel 1B |

**Attachment 1, for Fire Area 1-A-BATB**

| Step # | Description |
|---|---|
| 1.b(1) | Shut 1SI-327, Low Head SI Train B to Hot Leg Crossover Isol. Vlv. |
| 1.d(2) | Open 1SI-327, Low Head SI Train B to Hot Leg Crossover Isol. Vlv. |

**Attachment 1, for Fire Area 1-A-EPA**

| Step # | Description |
|---|---|
| 7.b(1) | Shut 1SI-326, Low Head SI Train A to Hot Leg Crossover Isol. Vlv. |
| 7.d(2) | Open 1SI-326, Low Head SI Train A to Hot Leg Crossover Isol. Vlv. |

**Attachment 1, for Fire Area 1-A-BAL SSA Area 1-A-BAL-B**

| Step # | Description |
|---|---|
| 21.b(2) | Open 1SW-270 locally (RAB 261). |
| 22.c | Verify open 1SW-271, ESW Header B Return to Aux. Reservoir. |
| 22.d(2) | Open 1SW-270 locally (RAB 261). (Same as step 21.b(2) above but for different plant conditions.) |

Attachment 3

## MANUAL ACTIONS DESCRIBED IN AOP-036 WITH DIESEL-POWERED FLOURESCENT LIGHTING

### Section 3.0, for All Fire Areas

| Step # | Description |
|---|---|
| 12.c RNO | Monitor AFW pump suction pressure indicators as an alternative to CST level indication: (Refer to Attachment 4, AFW Suction Pressure vs. CST level)<br>• PI-2271 (at TDAFW Pump) |
| 13.b(3) | (a) Shut 1CS-228, Normal Charging FCV Inlet Isolation Valve.<br>(b) Throttle 1CS-227, Normal Charging FCV Bypass, as necessary to control charging flow. |
| 13.c RNO | (3) Open one of the following breakers:<br>• 1B31-SB-4C, 1SI-3 BIT Outlet<br>• 1A31-SA-4C, 1SI-4 BIT Outlet |
| 13.c RNO | When directed by MCR, then locally throttle the de-energized valve to maintain PRZ level:<br>• 1SI-3, BIT Outlet Isolation<br>• 1SI-4, BIT Outlet Isolation |

### Attachment 1, for Fire Area 1-A-ACP

| Step # | Description |
|---|---|
| 1.b | Secure rod drive MG sets using OP-104 |
| 2.c | Obtain a transfer panel key 33, 34, 35, 36, 99 or 106 (MCR or ACP key locker) and de-energize the TDAFW Pump Trip and Throttle Valve by removing 2 fuses |
| 2.f | Locally verify open TDAFW pump trip and throttle valve & 1MS-70 |
| 2.g | Locally monitor AFW pump suction pressure |
| 4 | Remove the fuses for 1BD-30 SA and 1BD-49 SA at panel ARP-19A |

### Attachment 1, for Fire Area 1-A-BATB

| Step # | Description |
|---|---|

1.a(2) **(2) DE-ENERGIZE** the following valves:
- 1SI-322 at breaker 1A31-SA-6E (RAB 286)
- 1SI-323 at breaker 1B31-SB-6E (RAB 286)

1.b(2) **(2) OPEN** the following valves to align RHR HX outlet flow to the RWST:
- 1SI-448, Low Head SI Recirc to RWST Root Isol. Vlv
- 1SI-331, Low Head SI Recirc to RWST Isol. Vlv

1.d(1) **(1) SHUT** the following valves to isolate RHR HX outlet flow from the RWST:
- 1SI-448, Low Head SI Recirc to RWST Root Isol. Vlv
- 1SI-331, Low Head SI Recirc to RWST Isol. Vlv

**Attachment 1, for Fire Area 1-A-EPA**

| Step # | Description |
|---|---|
| 4.b(1) | **DE-ENERGIZE** the following valves:<br>• 1SI-246, SI Accumulator A Discharge, at breaker 1A21-SA-5C<br>• 1SI-248, SI Accumulator C Discharge, at breaker 1A21-SA-3D |
| 7.a(2) | **(2) DE-ENERGIZE** the following valves:<br>• 1SI-322 at breaker 1A31-SA-6E (RAB 286)<br>• 1SI-323 at breaker 1B31-SB-6E (RAB 286) |
| 7.b(2) | **(2) OPEN** the following valves to align RHR HX outlet flow to the RWST:<br>• 1SI-448, Low Head SI Recirc to RWST Root Isol. Vlv<br>• 1SI-331, Low Head SI Recirc to RWST Isol. Vlv |
| 7.d(1) | **(1) SHUT** the following valves to isolate RHR HX outlet flow from the RWST:<br>• 1SI-448, Low Head SI Recirc to RWST Root Isol. Vlv<br>• 1SI-331, Low Head SI Recirc to RWST Isol. Vlv |

**AOP-36 Attachment 1 (, for Fire Area 1-A-BAL, SSA Area 1-A-BAL-B**

| Step # | Description |
|---|---|
| 1.a | **VERIFY** the following valves are OPEN<br>• 1CS-214, Charging/SI Pumps Miniflow Isol. (RAB 236 near Boric Acid Pumps)<br>• 1CS-169, CSIP Suction Header Xconn (RAB 247 above CSIPs)<br>• 1CS-218, CSIP Discharge Header Xconn (RAB 247 above CSIPs) |

5 **OBTAIN** SSPS Key 96 AND **DEFEAT** both trains of SSPS by removing the listed fuses in the front of the listed SSPS Output Cabinets:
- Train A, Output Cabinet No. 1, Output Relay Power fuses
- Train A, Output Cabinet No. 2, fuses 61 and 62
- Train B, Output Cabinet No. 1, Output Relay Power fuses
- Train B, Output Cabinet No. 2, fuses 61 and 62

16.b(1) **DE-ENERGIZE** the following valves:
- 1SI-246, SI Accumulator A Discharge, at breaker 1A21-SA-5C (RAB 286)
- 1SI-247, SI Accumulator B Discharge, at breaker 1B21-SB-5C (RAB 286)
- 1SI-248, SI Accumulator C Discharge, at breaker 1A21-SA-3D (RAB 286)

22.a **VERIFY OPEN** 1SW-274, ESW Return Header B to NSW.

22.d(3) **WHEN** 1SW-270 has been opened,
**THEN SHUT** 1SW-274, ESW Return Header B to NSW.

**Attachment 2, Safe Shutdown 1 Equipment Powered by Safe Shutdown 2**

| Step # | Description |
|---|---|
| 2 | **IF** control power is lost to 1CS-231, Charging Flow controller,<br>**THEN PERFORM** the following locally:<br>**a. SHUT** 1CS-228, Normal Charging FCV Inlet Isolation Valve.<br>**b. MAINTAIN** 25% to 60% PRZ level (charging flow) using 1CS-227, Normal Charging FCV Bypass. |
| 6.a | **ISOLATE** 1RH-20 air supply, 1IA-128-I2, to cause it to fail closed. |
| 6.d | **VERIFY** RHR is cooling the RCS by trending temperature using ONE of the following methods:<br>• Local temperature indication TI-5551A (RHR Heat Exchanger Outlet) |

**Attachment 3, Safe Shutdown 2 Equipment Powered by Safe Shutdown 1**

| Step # | Description |
|---|---|
| 4.b | **(1) OPEN** feeder breaker 1A21-SA-5C, Accum 1A-SA Disch Iso (RAB 286).<br>**(2) OPEN** feeder breaker 1A21-SA-3D, Accum 1C-SA Disch Iso (RAB 286). |

6.d **VERIFY** RHR is cooling the RCS by trending temperature using ONE of the following methods:

- Local temperature indication TI-5551A (RHR Heat Exchanger Outlet)

## LOCAL MANUAL OPERATOR ACTION STEPS REVIEWED FOR ACHIEVING HOT STANDBY

Summary of Number of Local Manual Action Steps to be Performed Outside of the Control Room to Achieve and Maintain Hot Standby

| | Number of Manual Action Steps | | |
|---|---|---|---|
| Fire Area / Zone | Generic Steps in AOP-36 for All Fire Areas | Area Specific Steps in AOP-036 and Other Procedures Referenced by AOP-36 | Total Steps by Fire Area/Zone |
| 1-A-BAL-B | 10 | 29 | 39 |
| 1-A-BATB | 10 | 14 | 24 |
| 1-A-EPA | 10 | 14 | 24 |
| 1-A-ACP | 10 | 45 | 55 |

Listing of AOP-036 Manual Action Steps Reviewed for Safe Shutdown Following a Fire

| **AOP-36 Section 3.0 Actions (Generic Steps for All Fire Areas/Zones):** | |
|---|---|
| Step 12.c RNO | **MONITOR** AFW pump suction pressure indicators as an alternative to CST level indication: (Refer to Attachment 4, AFW Suction Pressure vs. CST level)<br>• PI-2271 (at TDAFW Pump) |
| Step 13.b(3) | **Locally PERFORM** the following (248' RAB):<br>(a) **SHUT** 1CS-228, Normal Charging FCV Inlet Isolation Valve.<br>(b) **THROTTLE** 1CS-227, Normal Charging FCV Bypass, as necessary to control charging flow. |
| Step 13.c RNO | **ESTABLISH** flow through the Hi Head SI Line, as follows:<br>(1).....*(MCR action)*<br>(2).....*(MCR action)*<br>(3) **OPEN** ONE of the following breakers:<br>• 1B31-SB 4C, 1SI-3 BIT Outlet<br>• 1A31-SA 4C, 1SI-4 BIT Outlet<br>(4) **WHEN** directed by MCR, **THEN locally THROTTLE** the de-energized valve to maintain PRZ level: |

| | |
|---|---|
| | • 1SI-3, BIT Outlet Isolation<br>• 1SI-4, BIT Outlet Isolation |
| Step14.b | **UNLOCK and SHUT** the affected manual block valve(s): (Steam Tunnel Platform El. 280)<br>• 1MS-59, SG A PORV Manual Block<br>• 1MS-61, SG B PORV Manual Block<br>• 1MS-63, SG C PORV Manual Block |

| **AOP-36 Attachment 1 (Area Specific) Actions For Fire Area 1-A-BATB:** | |
|---|---|
| Step 1 | **IF** RHR suction valves spuriously open resulting in RWST drain down, **THEN PERFORM** the following recommended actions, as required: |
| Step 1.a | **ISOLATE** the Containment Recirc Sumps from the RWST, as follows:<br>(1) **SHUT** the following valves:<br>• 1SI-322, RWST To RHR Pump A-SA (RAB 286)<br>• 1SI-323, RWST To RHR Pump B-SB (RAB 286)<br>(2) **DE-ENERGIZE** the following valves:<br>• 1SI-322 at breaker 1A31-SA-6E (RAB 286)<br>• 1SI-323 at breaker 1B31-SB-6E (RAB 286) |
| Step 1.b | **REFILL** the RWST with A RHR Pump, as follows:<br>(1) **SHUT** 1SI-327, Low Head SI Train B to Hot Leg Crossover Isol Vlv.<br>(2) **OPEN** the following valves to align RHR HX outlet flow to the RWST:<br>• 1SI-448, Low Head SI Recirc to RWST Root Isol Vlv<br>• 1SI-331, Low Head SI Recirc to RWST Isol Vlv<br>(3) **USE** the RHR Pump as needed. |
| Step 1.d | **WHEN** RHR Pumps are no longer required to fill the RWST, **THEN:**<br>(1) **SHUT** the following valves to isolate RHR HX outlet flow from the RWST:<br>• 1SI-448, Low Head SI Recirc to RWST Root Isol Vlv<br>• 1SI-331, Low Head SI Recirc to RWST Isol Vlv<br>(2) **OPEN** 1SI-327, Low Head SI Train B to Hot Leg Crossover Isol Vlv. |
| Step 2 | **PERFORM** the following to prevent spurious valve opening: |

| | |
|---|---|
| Step 2.a | **VERIFY** the following valves are SHUT:<br>• 1SI-301, CV Sump 1B To RHR Pmp 1B-SB CIV (RAB 286)<br>• 1SI-311, CV Sump 1B To RHR Pmp 1B-SB Downstrm Iso Vlv (RAB 286) |
| Step 2.b | **DE-ENERGIZE** the following valves:<br>• 1SI-301 at breaker 1B21-SB-11B (RAB 286)<br>• 1SI-311 at breaker 1B21-SB-7A (RAB 286) |

| **AOP-36 Attachment 1 (Area Specific) Actions For Fire Area 1-A-EPA:** | |
|---|---|
| Step 7 | **IF** RHR suction valves spuriously open resulting in RWST drain down,<br>**THEN PERFORM** the following recommended actions, as required: |
| Step 7.a | **ISOLATE** the Containment Recirc Sumps from the RWST, as follows:<br>(1) **SHUT** the following valves:<br>• 1SI-322, RWST To RHR Pump A-SA (RAB 286)<br>• 1SI-323, RWST To RHR Pump B-SB (RAB 286)<br>(2) **DE-ENERGIZE** the following valves:<br>• 1SI-322 at breaker 1A31-SA-6E (RAB 286)<br>• 1SI-323 at breaker 1B31-SB-6E (RAB 286) |
| Step 7.b | **REFILL** the RWST with B RHR Pump, as follows:<br>(1) **SHUT** 1SI-326, Low Head SI Train A to Hot Leg Cross-over Isol Vlv.<br>(2) **OPEN** the following valves to align RHR HX outlet flow to the RWST:<br>• 1SI-448, Low Head SI Recirc to RWST Root Isol Vlv<br>• 1SI-331, Low Head SI Recirc to RWST Isol Vlv<br>(3) **USE** the RHR Pump as needed. |
| Step 7.c | **IF** charging is required in the interim,<br>**THEN USE** the Boric Acid Tanks. |
| Step 7.d | **WHEN** RHR Pumps are no longer required to fill the RWST,<br>**THEN:**<br>(1) **SHUT** the following valves to isolate RHR HX outlet flow from the RWST:<br>• 1SI-448, Low Head SI Recirc to RWST Root Isol Vlv<br>• 1SI-331, Low Head SI Recirc to RWST Isol Vlv<br>(2) **OPEN** 1SI-326, Low Head SI Train A to Hot Leg Cross-over Isol Vlv. |

| | |
|---|---|
| Step 8 | **PERFORM** the following to prevent spurious valve opening: |
| Step 8.a | **VERIFY** the following valves are SHUT:<br>• 1SI-300, CV Sump 1A To RHR Pmp 1A-SA CIV (RAB 286)<br>• 1SI-310, CV Sump 1A To RHR Pmp 1A-SA Downstrm Iso Vlv (RAB 286) |
| Step 8.b | **DE-ENERGIZE** the following valves:<br>• 1SI-300 at breaker 1A21-SA-7C (RAB 286)<br>• 1SI-310 at breaker 1A21-SA-9B (RAB 286) |

| **AOP-36 Attachment 1 (Area Specific) Actions for Fire Area 1-A-BAL:** | |
|---|---|
| Step 1 | **PERFORM** the following to prevent spurious valve operations: |
| Step 1.a | **VERIFY** the following valves are OPEN<br>• 1CS-214, Charging/SI Pumps Miniflow Isol (RAB 236 near Boric Acid Pumps)<br>• 1CS-169, CSIP Suction Header Xconn (RAB 247 above CSIPs)<br>• 1CS-218, CSIP Discharge Header Xconn (RAB 247 above CSIPs)<br>• 1CC-252, CCW From RCP Thermal Barrier FCV (RAB 236 Scalloped Area) |
| Step 1.b | **DE-ENERGIZE** the following valves:<br>• 1CS-214 at breaker 1A35-SA-4C (RAB 261)<br>• 1CS-169 at breaker 1A35-SA-4B (RAB 261)<br>• 1CS-218 at breaker 1B35-SB-14D (RAB 261)<br>• 1CC-252 at breaker 1E12-6B (RAB 261) |
| Step 5 | **CAUTION**<br>• The following step will inhibit all automatic and manual safeguards functions since a fire in this area could cause spurious actuations as well as disable controls for resetting SI.<br>• Removal of Output Relay Power Fuses from both trains of SSPS will generate a Reactor Trip signal. The Reactor should be shut down prior to performing the following step. |

| | |
|---|---|
| | **OBTAIN** SSPS Key 96<br>AND **DEFEAT** both trains of SSPS by removing the listed fuses in the front of the listed SSPS Output Cabinets:<br>• Train A, Output Cabinet No. 1, Output Relay Power fuses<br>• Train A, Output Cabinet No. 2, fuses 61 and 62<br>• Train B, Output Cabinet No. 1, Output Relay Power fuses<br>• Train B, Output Cabinet No. 2, fuses 61 and 62 |
| Step 20 | **IF** the following valves cannot be shut due to fire damage to their control cables,<br>• 1CS-165, VCT Outlet/Dilution FCV (1-LCV-115C)<br>• 1CS-166, VCT Outlet (1-LCV-115E)<br>**THEN:** |
| Step 20.a | **STOP** ALL CSIPs. |
| Step 20.b | **SHUT** EITHER of the following valves:<br>• 1CS-170, A CSIP Suction X-conn<br>• 1CS-168, C CSIP Suction X-conn with A CSIP |
| Step 20.c | **SHUT** EITHER of the following valves:<br>• 1CS-169, C CSIP Suction X-conn with B CSIP<br>• 1CS-171, B CSIP Suction X-conn |
| Step 20.d | **VERIFY SHUT** 1CS-214, Charging/SI Pumps Miniflow Isol. |
| Step 21 | **IF** BOTH of the following occur due to fire damage to their control cables:<br>• 1SW-270, ESW Header A Return to Aux Reservoir, spuriously SHUTS<br>• 1SW-276, ESW to NSW Discharge HDR, spuriously OPENS<br>**THEN ALIGN** flow to the cooling tower, as follows: |
| Step 21.a | **VERIFY OPEN** 1SW-275, ESW Return Header A to NSW. |
| Step 21.b | **WHEN** time permits,<br>**THEN:**<br>**(1) DE-ENERGIZE** 1SW-270, ESW Header A Return to Aux Reservoir, at breaker 1A35-SA-9C (RAB 261).<br>**(2) OPEN** 1SW-270 locally (RAB 261).<br>**(3) WHEN** 1SW-270 is open,<br>**THEN SHUT** 1SW-276, ESW to NSW Discharge Hdr. |

| | |
|---|---|
| Step 22 | **IF** BOTH 1SW-270 AND 1SW-276 shut,<br>**THEN CROSS-CONNECT** ESW Discharge Headers as follows: |
| Step 22.a | **VERIFY OPEN** 1SW-274, ESW Return Header B to NSW. |
| Step 22.b | **VERIFY OPEN** 1SW-275, ESW Return Header A to NSW. |
| Step 22.c | **VERIFY OPEN** 1SW-271, ESW Header B Return to Aux Reservoir. |
| Step 22.d | **WHEN** time permits,<br>**THEN:**<br>**(1) DE-ENERGIZE** 1SW-270, ESW Header A Return to Aux Reservoir, at breaker 1A35-SA-9C (RAB 261).<br>**(2) OPEN** 1SW-270 locally (RAB 261).<br>**(3) WHEN** 1SW-270 has been opened,<br>**THEN SHUT** 1SW-274, ESW Return Header B to NSW. |

| **AOP-36 Attachment 1 (Area Specific) Actions for Fire Area 1-A-ACP:** | | |
|---|---|---|
| Step 1b | SECURE Rod Drive MG sets using OP-104, Rod Control System | |
| | OP-104 Step Number | Description |
| | 7.3.2.02 | Place GENERATOR CIRCUIT BREAKER CONTROL switch 1A to TRIP |
| | 7.3.2.03 | Place MOTOR CIRCUIT BREAKER CONTROL switch 1A to TRIP |
| | 7.3.2.04 | Open Reactor Trip Breakers, if not already open. |
| | 7.3.2.05 | Place GENERATOR CIRCUIT BREAKER CONTROL switch 1B to TRIP |
| | | Place MOTOR CIRCUIT BREAKER CONTROL switch 1B to TRIP |
| Step 2 | If BOTH MDAFW pumps are disabled, THEN: | |

| | | |
|---|---|---|
| Step 2c | Obtain a transfer panel key 33, 34, 35, 36, 99 or 106 (MCR or ACP key locker)... | |
| | ... and de-energize the TDAFW Pump Trip and Throttle Valve by removing fuses 1A-11/1976 and 1A-12/1976 | |
| Step 2d | De-energize 1MS-70 by opening disconnect switch on DP-1A2-SA-2B. | |
| Step 2f | IF TDAFW Pump is NOT operating properly, THEN locally... | |
| | ...VERIFY OPEN TDAFW Pump Trip and Throttle Valve | |
| | ...VERIFY OPEN 1MS-70, Main Steam B to Aux FW Turbine | |
| Step 2g | IF MCB CST level indication is NOT available, | |
| | THEN locally monitor AFW pump suction pressure using Attachment 4. | |
| Step 4 | REMOVE the fuse for 1BD-30 SA at panel ARP-19A | |
| | REMOVE the fuse for 1BD-49 SA at panel ARP-19A | |
| Step 6 | OPEN the power supply breaker for 1CS-235 at breaker 1B31-SB-10A | |
| Step 7 | ISOLATE AND VENT IA to 1CH-279 | |
| Step 7a | SHUT "1IA-871-I1" | |
| Step 7b | OPEN air filter drain petcocks on Instrument Air Filter | |
| Step 7c | CHECK 1CH-279, AH-12 1ASA valve OPEN | |
| Step 8 | OPEN the power supply breaker for 1CS-171 at breaker 1B35-SB-4D | |
| Step 9 | Locally VERIFY OPEN 1CS-171, B CSIP Suction X-Conn valve | |
| | Locally VERIFY OPEN 1CS-235, Charging Line Isolation valve | |
| Step 10 | Locally verify shut 1BD-30, SG 1B Blowdown Isolation valve | |
| | Locally verify shut 1BD-49, SG 1C Blowdown Isolation valve | |
| Step 13 | IF SG C PORV cycles erroneously, THEN: | |
| Step 13c | IF SG C PORV manual/automatic station does <u>not</u> function properly, | |
| | THEN locally OPERATE SG C PORV using OP-126 for desired cooldown rate. | |
| | OP-126 <u>Step Number</u> | <u>Description</u> |
| | 8.2.1.2.01 | Obtain pliers, flashlight, head set, extension cord |

| | | |
|---|---|---|
| | 8.2.1.2.02 | Open Servo Valve Solenoid feeder breaker PP-1A312-SA-3 |
| | | Open Servo Valve Solenoid feeder breaker PP-1B312-SB-3 |
| | | Open Servo Valve Solenoid feeder breaker IDP-1A-SIII-11 |
| | 8.2.1.2.03 | Remove the cover from the side of the PORV |
| | 8.2.1.2.04 | Establish communications with the Control Room |
| | 8.2.1.2.07 | To throttle open the PORV, |
| | 8.2.1.2.07a | Rotate Solenoid B manual override approximately 3/4 turn in the clockwise direction |
| | 8.2.1.2.07b | As directed by the Control Room, slowly rotate Solenoid A manual override approximately 3/4 turn in the clockwise direction |
| | 8.2.1.2.07c | When the PORV is at its desired position, place Solenoid A manual override back to its original position |
| | 8.2.1.2.08 | To partially shut the PORV, |
| | 8.2.1.2.08a | Check Solenoid A manual override in the fully counterclockwise position. |
| | 8.2.1.2.08b | As directed by the Control Room slowly rotate Solenoid B manual override to its original position by rotating it approximately 3/4 turn in the counterclockwise direction, until the PORV starts to shut. |
| | 8.2.1.2.08c | When the PORV is at the desired position, rotate Solenoid B manual override approximately 3/4 turn in the clockwise direction. |
| Step 14 | IF FCV-2071C, Aux FW C Regulator 1AF-131, spuriously CLOSES, THEN | |
| Step 14a | REMOVE fuse 1A-5/1952 at Transfer Panel 1B | |
| Step 14b | THROTTLE 1AF-149, Stm Turb Aux FW C Isolation, to maintain SG C level | |

| **AOP-36 Attachment 2 Actions For SSD 1 Equipment Powered by SSD 2:** | |
|---|---|
| Step 2 | **IF** control power is lost to 1CS-231, Charging Flow controller, **THEN PERFORM** the following locally: |

| | |
|---|---|
| Step 2.a | **SHUT** 1CS-228, Normal Charging FCV Inlet Isolation Valve. |
| Step 2.b | **MAINTAIN** 25% to 60% PRZ level (charging flow) using 1CS-227, Normal Charging FCV Bypass. |

| **AOP-36 Attachment 3 Actions For SSD 2 Equipment Powered by SSD 1:** | |
|---|---|
| | This attachment was reviewed but contained no hot standby local manual operator actions. |

**LOCAL MANUAL OPERATOR ACTION STEPS**
**REVIEWED FOR ACHIEVING <u>COLD SHUTDOWN</u>**

| **AOP-36 Attachment 1 (Area Specific) Actions for Fire Area 1-A-EPA:** | |
|---|---|
| Step 4.b | **WHEN** manpower is available,<br>**THEN:**<br>**(1) DE-ENERGIZE** the following valves:<br>• 1SI-246, SI Accumulator A Discharge, at breaker 1A21-SA-5C<br>• 1SI-248, SI Accumulator C Discharge, at breaker 1A21-SA-3D |

| **Attachment 2, SSD 1 Equipment Powered by SSD 2:** | |
|---|---|
| Step 6 | **IF** 1RH-30, RHR Heat Xchg A Out Flow Cont, **OR** 1RH-20, RHR Hx Xchg A Byp Flow Cont, cannot be controlled due to loss of control power,<br>**THEN:** |
| Step 6.a | **ISOLATE** 1RH-20 air supply, 1IA-128-I2, to cause it to fail closed. |
| Step 6.d | **VERIFY** RHR is cooling the RCS by trending temperature using ONE of the following methods:<br><br>• *.....(MCR action)*<br>• Local temperature indication TI-5551A (RHR Heat Exchanger Outlet) |

## MANUAL ACTIONS DESCRIBED IN AOP-036 WITHOUT REQUIRED EMERGENCY LIGHTING

### AOP-36, Section 3.0, for All Fire Areas

| Step # | Description |
|---|---|
| 13.a(7) | Open 1CS-526, BA Tk Supply to CSIP Isol. Vlv. |

### AOP-36, Attachment 1, for Fire Area 1-A-ACP

| Step # | Description |
|---|---|
| 1.b | Secure Rod Drive MG sets using OP-104, Rod Control System |
| 2.c | Obtain a transfer panel key 33, 34, 35, 36, 99 or 106 (MCR or ACP key locker) and de-energize the TDAFW Pump Trip and Throttle Valve by removing 2 fuses |
| 2.d | De-energize 1MS-70 by opening disconnect switch on DP-1A2-SA-2B. |
| 2.f | Locally verify open TDAFW Pump Trip and Throttle Valve and 1MS-70, Main Steam B to Aux FW Turbine |
| 2.g | Locally monitor AFW pump suction pressure |
| 4 | Remove the fuses for 1BD-30 SA and 1BD-49 SA at panel ARP-19A |
| 6 | Open the power supply breaker for 1CS-235 at breaker 1B31-SB-10A |
| 9 | Locally verify open 1CS-235 |
| 14.a | Remove fuse 1A-5/1952 at Transfer Panel 1B |

### AOP-36, Attachment 1, for Fire Area 1-A-BATB

| Step # | Description |
|---|---|
| 1.b(1) | Shut 1SI-327, Low Head SI Train B to Hot Leg Crossover Isol. Vlv. |
| 1.d(2) | Open 1SI-327, Low Head SI Train B to Hot Leg Crossover Isol. Vlv. |

### AOP-36, Attachment 1, for Fire Area 1-A-EPA

| Step # | Description |
|---|---|
| 7.b(1) | Shut 1SI-326, Low Head SI Train A to Hot Leg Crossover Isol. Vlv. |
| 7.d(2) | Open 1SI-326, Low Head SI Train A to Hot Leg Crossover Isol. Vlv. |

**AOP-36, Attachment 1, for Fire Area 1-A-BAL SSA Area 1-A-BAL-B**

| Step # | Description |
|---|---|
| 21.b(2) | Open 1SW-270 locally (RAB 261). |
| 22.c | Verify open 1SW-271, ESW Header B Return to Aux. Reservoir. |
| 22.d(2) | Open 1SW-270 locally (RAB 261). (Same as step 21.b(2) above but for different plant conditions.) |

**MANUAL ACTIONS DESCRIBED IN AOP-036**
**WITHOUT REQUIRED BATTERY-BACKED EMERGENCY LIGHTING**
**BUT WITH DIESEL-POWERED FLOURESCENT LIGHTING**

**AOP-36, Section 3.0, for All Fire Areas**

| Step # | Description |
|---|---|
| 12.c RNO | Monitor AFW pump suction pressure indicators as an alternative to CST level indication: (Refer to Attachment 4, AFW Suction Pressure vs. CST level)<br>• PI-2271 (at TDAFW Pump) |
| 13.b(3) | (a) Shut 1CS-228, Normal Charging FCV Inlet Isolation Valve.<br>(b) Throttle 1CS-227, Normal Charging FCV Bypass, as necessary to control charging flow. |
| 13.c RNO | (3) Open one of the following breakers:<br>• 1B31-SB-4C, 1SI-3 BIT Outlet<br>• 1A31-SA-4C, 1SI-4 BIT Outlet |
| 13.c RNO | When directed by MCR, then locally throttle the de-energized valve to maintain PRZ level:<br>• 1SI-3, BIT Outlet Isolation<br>• 1SI-4, BIT Outlet Isolation |

**AOP-36, Attachment 1, for Fire Area 1-A-ACP**

| Step # | Description |
|---|---|
| 1.b | Secure rod drive MG sets using OP-104 |
| 2.c | Obtain a transfer panel key 33, 34, 35, 36, 99 or 106 (MCR or ACP key locker) and de-energize the TDAFW Pump Trip and Throttle Valve by removing 2 fuses |

| | |
|---|---|
| 2.f | Locally verify open TDAFW pump trip and throttle valve & 1MS-70 |
| 2.g | Locally monitor AFW pump suction pressure |
| 4 | Remove the fuses for 1BD-30 SA and 1BD-49 SA at panel ARP-19A |

**AOP-36, Attachment 1, for Fire Area 1-A-BATB**

| Step # | Description |
|---|---|
| 1.a(2) | **(2) DE-ENERGIZE** the following valves:<br>• 1SI-322 at breaker 1A31-SA-6E (RAB 286)<br>• 1SI-323 at breaker 1B31-SB-6E (RAB 286) |
| 1.b(2) | **(2) OPEN** the following valves to align RHR HX outlet flow to the RWST:<br>• 1SI-448, Low Head SI Recirc to RWST Root Isol. Vlv<br>• 1SI-331, Low Head SI Recirc to RWST Isol. Vlv |
| 1.d(1) | **(1) SHUT** the following valves to isolate RHR HX outlet flow from the RWST:<br>• 1SI-448, Low Head SI Recirc to RWST Root Isol. Vlv<br>• 1SI-331, Low Head SI Recirc to RWST Isol. Vlv |

**AOP-36, Attachment 1, for Fire Area 1-A-EPA**

| Step # | Description |
|---|---|
| 4.b(1) | **DE-ENERGIZE** the following valves:<br>• 1SI-246, SI Accumulator A Discharge, at breaker 1A21-SA-5C<br>• 1SI-248, SI Accumulator C Discharge, at breaker 1A21-SA-3D |
| 7.a(2) | **(2) DE-ENERGIZE** the following valves:<br>• 1SI-322 at breaker 1A31-SA-6E (RAB 286)<br>• 1SI-323 at breaker 1B31-SB-6E (RAB 286) |
| 7.b(2) | **(2) OPEN** the following valves to align RHR HX outlet flow to the RWST:<br>• 1SI-448, Low Head SI Recirc to RWST Root Isol. Vlv<br>• 1SI-331, Low Head SI Recirc to RWST Isol. Vlv |
| 7.d(1) | **(1) SHUT** the following valves to isolate RHR HX outlet flow from the RWST:<br>• 1SI-448, Low Head SI Recirc to RWST Root Isol. Vlv<br>• 1SI-331, Low Head SI Recirc to RWST Isol. Vlv |

**AOP-36, Attachment 1, for Fire Area 1-A-BAL-B**

| Step # | Description |
|---|---|
| 1.a | **VERIFY** the following valves are OPEN<br>• 1CS-214, Charging/SI Pumps Miniflow Isol. (RAB 236 near Boric Acid Pumps)<br>• 1CS-169, CSIP Suction Header Xconn (RAB 247 above CSIPs)<br>• 1CS-218, CSIP Discharge Header Xconn (RAB 247 above CSIPs) |
| 5 | **OBTAIN** SSPS Key 96 AND **DEFEAT** both trains of SSPS by removing the listed fuses in the front of the listed SSPS Output Cabinets:<br>• Train A, Output Cabinet No. 1, Output Relay Power fuses<br>• Train A, Output Cabinet No. 2, fuses 61 and 62<br>• Train B, Output Cabinet No. 1, Output Relay Power fuses<br>• Train B, Output Cabinet No. 2, fuses 61 and 62 |
| 16.b(1) | **DE-ENERGIZE** the following valves:<br>• 1SI-246, SI Accumulator A Discharge, at breaker 1A21-SA-5C (RAB 286)<br>• 1SI-247, SI Accumulator B Discharge, at breaker 1B21-SB-5C (RAB 286)<br>• 1SI-248, SI Accumulator C Discharge, at breaker 1A21-SA-3D (RAB 286) |
| 22.a | **VERIFY OPEN** 1SW-274, ESW Return Header B to NSW. |
| 22.d(3) | **WHEN** 1SW-270 has been opened,<br>**THEN SHUT** 1SW-274, ESW Return Header B to NSW. |

**AOP-36, Attachment 2, Safe Shutdown 1 Equipment Powered by Safe Shutdown 2**

| Step # | Description |
|---|---|
| 2 | **IF** control power is lost to 1CS-231, Charging Flow controller,<br>**THEN PERFORM** the following locally:<br>**a. SHUT** 1CS-228, Normal Charging FCV Inlet Isolation Valve.<br>**b. MAINTAIN** 25% to 60% PRZ level (charging flow) using 1CS-227, Normal Charging FCV Bypass. |
| 6.a | **ISOLATE** 1RH-20 air supply, 1IA-128-I2, to cause it to fail closed. |
| 6.d | **VERIFY** RHR is cooling the RCS by trending temperature using ONE of the following methods:<br>• Local temperature indication TI-5551A (RHR Heat Exchanger Outlet) |

**AOP-36, Attachment 3, Safe Shutdown 2 Equipment Powered by Safe Shutdown 1**

| Step # | Description |
|---|---|
| 4.b | **(1) OPEN** feeder breaker 1A21-SA-5C, Accum 1A-SA Disch Iso (RAB 286).<br>**(2) OPEN** feeder breaker 1A21-SA-3D, Accum 1C-SA Disch Iso (RAB 286). |
| | |
| 6.d | **VERIFY** RHR is cooling the RCS by trending temperature using ONE of the following methods:<br>• Local temperature indication TI-5551A (RHR Heat Exchanger Outlet) |