CNS OPERATIONS MANUAL EMERGENCY PROCEDURE 5.2SW SERVICE WATER CASUALTIES	USE: CONTINUOUS EFFECTIVE: 10/14/03 APPROVAL: SORC/IQA OWNER: OSG SUPV DEPARTMENT: OPS

6

R4-5A2D

1. ENTRY CONDITIONS

[ ] 1.1 Service water header pressure lowering.

[ ] 1.2 Service water loop crosstie valve automatic isolation.

[ ] 1.3 Indication/report of service water piping failure.

[ ] 1.4 Service water pump trip causing low system pressure isolation.

[ ] 1.5 River level ≤ 873' or forecasted to lower to ≤ 873'.

Scram Actions

2. AUTOMATIC ACTIONS

[ ] 2.1 SW-MO-36, LOOP CROSSTIE VLV, closes at < 20 psig SW Subsystem A header pressure.

[ ] 2.2 SW-MO-37, LOOP CROSSTIE VLV, closes at < 20 psig SW Subsystem B header pressure.

[ ] 2.3 SW pump in AUTO starts at < 17 psig, if normal or startup power available.

[ ] 2.4 Screen wash pump trips at 14" Hg suction pressure after a 50 second time delay has timed out.

3. IMMEDIATE OPERATOR ACTIONS

[ ] 3.1 None.

4. SUBSEQUENT OPERATOR ACTIONS

[ ] 4.1 Maintain system pressure > 38 psig in both loops (SW-PI-2715A(B)) as follows:

[ ] 4.1.1 Start available SW pump(s), as necessary.

[ ] 4.1.2 If SW pump(s) will not start:

[ ] 4.1.2.1 Ensure control switch of affected pump in NORMAL AFTER STOP (green flagged).

[ ] 4.1.2.2 Place affected pump MODE SELECTOR switch to MAN.

Scram Actions

[ ] 4.1.2.3 Start pump.

[ ] 4.1.2.4 Ensure MODE SELECTOR switch(es) aligned per Procedure 2.2.71.

[ ] 4.1.3 If pressure still < 38 psig, close SW-MO-116, SCREENWASH SUPPLY.

[ ] 4.1.4 If pressure > 38 psig, ensure MO-36 and/or MO-37 are open.

[ ] 4.2 **If SW System pressure < 38 psig in both loops and SW cooling cannot be restored to TEC, perform following:**

[ ] 4.2.1 **SCRAM and enter Procedure 2.1.5.**

[ ] 4.2.2 Trip main turbine.

[ ] 4.2.3 Rapidly reduce reactor pressure to 500 to 600 psig using main turbine BPVs per Procedure 2.2.77.1

[ ] 4.2.4 Trip both reactor recirculation pumps

[ ] 4.2.5 Use RCIC, per Procedure 2.2.67.1, as primary means to maintain reactor vessel water inventory

[ ] 4.2.6 Before steam tunnel temperature reaches 170°F:

[ ] 4.2.6.1 Close MSIVs

[ ] 4.2.6.2 Close MSL drain valves

[ ] 4.2.7 Enter following:

[ ] 4.2.7.1 Attachment 1

[ ] 4.2.7.2 Procedure 5.2REC.

[ ] 4.2.7.3 Procedure 2.4TEC

[ ] 4.2.7.4 Procedure 2.4RR

[ ] 4.3 Reduce power per Procedure 2.1.10 to maintain TEC temperatures < 100°F.

[ ] 4.4 Reduce power per Procedure 2.1.10 to maintain REC temperatures < 98°F.

[ ] 4.5 If SW cooling lost only to TEC System, enter Procedure 2.4TEC.

[ ] 4.6 If leak in SW System causing low system pressure, enter Procedure 5.1BREAK.

[ ] 4.7 If SW cooling lost to a running Diesel Generator, immediately trip DG as follows:

[ ] 4.7.1 If initiation signal present, locally at DG1(2) Control Panel, press and release EMERGENCY STOP.

[ ] 4.7.2 If no initiation signal present, place and hold DIESEL GEN 1(2) STOP/START switch to STOP for 1 to 2 seconds, then release.

[ ] 4.8 If flow blockage in intake bays causing low system pressure, enter Procedure 2.4VAC.

[ ] 4.9 If river level lowers to 873', exit this flowpath and enter Attachment 2.

[ ] 4.10 If only one loop of SW available:

[ ] 4.10.1 Ensure REC HX in service for the operating SW loop by entering Attachment 1.

[ ] 4.10.2 Perform following, as necessary, to restore cooling to non-critical header:

[ ] 4.10.2.1 Close SW-1490, NON-CRIT HEADER ISOLATION (SW Pump Room west)

[ ] 4.10.2.2 Ensure system pressure > 38 psig in active loop on SW-PI-2715A(B).

[ ] 4.10.2.3 Open SW-MO-36 or SW-MO-37 in active loop.

[ ] 4.10.2.4 Maintain system pressure > 38 psig as follows:

[ ] a. Start available SW pump(s), as necessary.

[ ] b. If SW pump(s) will not start:

[ ] 1. Ensure control switch of affected pump in NORMAL AFTER STOP (green flagged).

[ ] 2. Place affected pump MODE SELECTOR switch to MAN.

[ ] 3. Start pump.

[ ] 4. Ensure MODE SELECTOR switch(es) aligned per Procedure 2.2.71.

[ ] c. Slowly throttle open SW-1490 while maintaining system pressure > 38 psig.

[ ] d. Ensure MODE SELECTOR switch(es) aligned per Procedure 2.2.71.

[ ] 4.11 If DG loaded and any of following conditions are met, trip DG per Step 4.11.3.1 or 4.11.3.2, as applicable.

[ ] 4.11.1 Lube oil temperature ≥ 180°F.

[ ] 4.11.2 Jacket water temperature ≥ 205°F.

[ ] 4.11.3 Intercooler air outlet temperature ≥ 150°F.

[ ] 4.11.3.1 If initiation signal present, locally at DG1(2) Control Panel, press and release EMERGENCY STOP.

[ ] 4.11.3.2 If no initiation signal present, place and hold DIESEL GEN 1(2) STOP/START switch to STOP for 1 to 2 seconds, then release.

[ ] 4.12 If DG1 running unloaded and not needed to supply 4160V Bus 1F:

[ ] 4.12.1 Locally at DG1 Control Panel, press and release EMERGENCY STOP.

[ ] 4.12.2 Close SW-265, DG1 AND DG1 H&V SUPPLY (DG1 Room).

[ ] 4.12.3 Close SW-264, DG1 AND DG1 H&V SUPPLY (DG1 Room).

[ ] 4.13 If DG2 running unloaded and not needed to supply 4160V Bus 1G:

[ ] 4.13.1 Locally at DG2 Control Panel, press and release EMERGENCY STOP.

[ ] 4.13.2 Close SW-266, DG2 AND DG2 H&V SUPPLY (DG2 Room).

[ ] 4.13.3 Close SW-267, DG2 AND DG2 H&V SUPPLY (DG2 Room).

[ ] 4.14 If Screen Wash and Sparger Systems not available:

[ ] 4.14.1 Remove as many circ water pumps as possible per Procedure 2.2.3.

[ ] 4.14.2 Open CW-V-935, CROSSTIE GATE BETWEEN D & E (IS-SWP-RM).

[ ] NOTE - When only one SW pump available to supply cooling to essential equipment, E Bay shall not be sparged with SW.

[ ] 4.14.3 Align SW System to Bay E spargers per Procedure 2.2.3.1.

[ ] 4.15 When SW System pressure has been restored, return system to a normal line-up per Procedure 2.2.71.

5. DISCUSSION

5.1 This procedure provides an orderly sequence of events to be followed to ensure the reactor is maintained in a safe condition until service water can be restored. Temporary measures are used to supply cooling water to the REC System which should be adequate at reduced heat loads. This procedure identifies those contingency actions which should be taken in the event of abnormally low river levels at CNS (river level falls below that expected for normal plant operation, as well as that required to meet the design basis of the plant). Additionally, it provides guidance for a method to maintain E Bay above 860.5' should river levels drop below 861'. Based on previous experience, decreases in river elevation can be anticipated well in advance.

5.2 SW System serves to remove heat from Turbine Building, Reactor Building, Diesel Generator Building, and Control Building equipment. Power is supplied to SW pumps from 4160V Buses F and G. Upon loss of off-site power, 4160V Buses F and G are fed from DGs and the SW pumps that have their switches in STANDBY (one per subsystem) start after a 13 second time delay.

5.3 Abnormal or emergency conditions which include a loss of off-site power and failure of one DG to start may reduce the number of available SW pumps to one. This condition may result in a loss of Plant Air System which could require manual valve operation in order to redirect SW System flows to essential loads. In this event, SW flows must be controlled to meet minimum requirements for REC cooling, DG cooling, SW and RHR SW Gland Water Systems, SW strainer blowdowns, and Control Room air conditioner cooling. SW flow to the Control Building Basement FCU is not required to support RHR SWBP Design Basis operation. However, SW flow to the Control Building Basement FCU should be established to maintain acceptable room temperature to maximize operational flexibility of other equipment located in the Control Building Basement. Sometime after 10 minutes into the event, SW flow to REC System is throttled, as necessary, before starting a SWBP for cooldown or torus cooling.

5.4 Because of the importance of SW System, prompt return of pumps to service is paramount. Turbine Building and Reactor Building Closed Cooling Water Systems are dependent upon the SW System to remove heat from equipment they serve. If Service Water System pressure is indicating < 38 psig in the Control Building Basement, there is inadequate system pressure to provide adequate cooling to the REC heat exchangers, Diesel Generators, or SW backup cooling to REC. For this reason, the reactor is shut down, depressurized, and reactor re-circulation pumps tripped. This procedure outlines actions to be taken by station personnel to maintain reactor safety.

5.5 Depending upon the actual rate of river level decrease, the plant will be in process of shutting down or will be shut down prior to reaching 865'. In any event, it is desirable to maintain the condenser as heat sink for cooldown, which means that the plant should be shut down and cooled down while CW pumps have known adequate submergence.

5.6 At an elevation of 865', it is assumed that the plant has been shut down and is cooled down or is in process of being shut down and cooled down. Non-essential loads should be either isolated or throttled within SW pump(s) capability at low river level

5.7 When river level drops below 865', performance of the SW System pump(s) should be monitored for cavitation and vibration. The in service pumps should be throttled between low flow (vibration) and high flow (cavitation) conditions as dictated by E Bay level and cooling loads. Additional pump(s) should be started or system flow reduced if cavitation is a problem. Conversely, pumps should be tripped or flow increased if vibration is a problem Vibration can be detected by monitoring SW pump drive motors and cavitation can be detected by observing discharge pressure, flow, and/or motor amperage oscillations.

5.8 Significant differences between river level and E Bay level may exist at low river levels due to flow losses over and around the end of the guide wall. These flow losses are much higher when CW pumps are operating because of their high capacity compared to SW pumps. Therefore, stopping CW pumps may restore low E Bay level.

5.9 A removable gate (OPA-GATE-1) is installed at the north end of the guide wall to ensure one service water pump is OPERABLE down to its design basis low river water level of 865'. The gate is sized to provide the required SW flow, but is not intended to support CW pump or Fire Protection Pump C operation. Therefore, if E Bay level cannot be maintained as a result of low river levels, all but one SW pump, Fire Pump C, and the CW pumps must be turned off to maintain adequate E Bay level. As river water level drops and head losses over, around, and through the guide wall increase, the number of CW pumps operating should be reduced after necessary power level reductions are made.

5.10 The guidance at river water levels below 863' is beyond design basis. In certain situations, getting flow past the guide wall and into E Bay may not be a problem. If providing water to E Bay at river levels down to 861' is not a problem, then running two throttled SW pumps may be better than running one unthrottled since cavitation is worse as individual pump flow increases. This is demonstrated by the chart on Attachment 3.

5.11 As 860.5' level is approached, SW pump capacity (without cavitation) is reduced due to less than design submergence. SW pumps will pump at decreasing capacity down to 860.5' (approximate elevation of impeller centerline) but will have to be throttled to minimize cavitation. Additionally, individual SW pump flows less than minimum rated flow of 1000 gpm may cause excessive vibration.

5.12 Prior to losing the SW pump submergence, temporary submersible river water pumps must be placed in service to maintain E Bay water level. Therefore, when E Bay level drops to 863' or is forecast to drop to 863', the temporary submersible river water pumps should be placed in standby (power connected and pumps installed).

5.13 PROBABLE CAUSES

5.13.1 Piping failure

5.13.2 Electrical fault

5.13.3 Ice jam

5.14 PROBABLE ANNUNCIATORS

5.14.1 A-4/A-6, SW PUMPS A & C DISCH HDR LOW PRESSURE.

5.14.2 A-4/A-7, SW-MO-36 ISOLATION

5.14.3 A-4/B-6, . 'RVICE WATER PUMP A TRIP.

5.14.4 A-4/B-7, SERVICE WATER PUMP C TRIP.

5.14.5 A-4/C-6, SERVICE WATER PUMP A OVLD/GROUND.

5.14.6 A-4/C-7 SERVICE WATER PUMP C OVLD/GROUND.

5.14.7 B-3/A-6, SW PUMP B & D DISCH HDR LOW PRESSURE.

5.14.8 B-3/A-7, SW-MO-37 ISOLATION.

5.14.9 B-3/B-6, SERVICE WATER PUMP B TRIP.

5.14.10 B-3/B-7, SERVICE WATER PUMP D TRIP.

5.14.11 B-3/C-6, SERVICE WATER PUMP B OVLD/GROUND.

5.14.12 B-3/C-7, SERVICE WATER PUMP D OVLD/GROUND.

6. REFERENCES

6.1 General Operating Procedure 2.1.5, Reactor Scram.

6.2 General Operating Procedure 2.1.10, Station Power Changes.

6.3 System Operating Procedure 2.2.3, Circulating Water System.

6.4 System Operating Procedure 2.2.3.1, Traveling Screen, Screen Wash, and Sparger Systems.

6.5 System Operating Procedure 2.2.20.1, Diesel Generator Operations.

6.6 System Operating Procedure 2.2.59, Plant Air System.

6.7 System Operating Procedure 2.2.65.1, REC Operations.

6.8 System Operating Procedure 2.2.67.1, Reactor Core Isolation Cooling System Operations.

6.9 System Operating Procedure 2.2.70, RHR Service Water Booster Pump System.

6.10 System Operating Procedure 2.2.71, Service Water System.

6.11 System Operating Procedure 2.2.76, Turbine Equipment Cooling Water System.

6.12 System Operating Procedure 2.2.77, Turbine Generator.

6.13 System Operating Procedure 2.2.77.1, Digital Electro-Hydraulic (DEH) Control System.

6.14 Abnormal Procedure 2.4RR, Reactor Recirculation Abnormal.

6.15 Abnormal Procedure 2.4TEC, TEC Abnormals.

6.16 Abnormal Procedure 2.4VAC, Loss of Condenser Vacuum.

6.17 Emergency Procedure 5.1BREAK, Pipe Break Outside Secondary Containment.

6.18 Emergency Procedure 5.2REC, Loss of REC.

6.19 Maintenance Procedure 7.2.80, Intake Structure Guide Wall Winterization and Restoration.

6.20 CNSS897608, Mace to McClure, Service Water Flow Rates at Low River Water Temperatures, dated November 9, 1989.

6.21 Condition Report 94-0896, Recent River Bottom Soundings do not Correspond with Bottom Elevations Stated in USAR.

6.22 NEDC 89-1957, Service Water Flow Rate at Low River Water Temperatures.

6.23 NEDC 94-021, REC-HX-A and REC-HX-B Maximum Allowable Accident Case Fouling.

6.24 NEDC 94-054, REC HX Discharge Header Temperature.

6.25 NEDC 94-271, Method for Determining SP 6.3.18.3 Acceptance Criteria Based on SP 6.3.18.5.

6.26 NEDC 96-029, Post-LOCA SW System Flow Variations with River Level.

6.27 NEDC 97-087, Acceptance Criteria for the HPCI Room Cooler and the Reactor Building Quad Coolers.

6.28 Record of Telephone Conversation, S. S. Freborg/D. S. Dageforde to Pat Dolphin (Byron Jackson) dated November 8, 1989.

6.29 SW System Design Basis Document.

6.30 Technical Specifications LCO 3.7.2, Service Water (SW) System and Ultimate Heat Sink (UHS).

7. RECORDS

7.1 Attachment 2 is sent to Operations Department Clerk (quality record upon attachment completion.

7.2 Attachment 5 is sent to Operations Department Clerk (quality record upon SM review).

8. ATTACHMENTS

1 - LOSS OF SW TO REC SYSTEM

2 - LOW RIVER LEVEL

3 - ESTIMATING SW SYSTEM FLOW

4 - DG FLOW INSTRUMENTS

5 - E BAY AND RIVER LEVEL

1. LOSS OF SW TO REC SYSTEM

[ ] 1.1 Ensure REC HX associated with available SW Subsystem in service by performing following:

[ ] 1.2 Place REC HX A in service as follows:

[ ] 1.2.1 Ensure SW-TCV-451A, REC HX A SW OUTLET TEMPERATURE CONTROL, switch in OPEN.

[ ] 1.2.2 Throttle SW-MO-650, REC HX A SERVICE OUTLET, to maintain SW Subsystem A pressure ≥ 38 psig on SW-PI-2715A or until flow through valve is 400 gpm if SW pressure < 38 psig and REC non-critical loops are isolated.

[ ] 1.2.2.1 If 400 gpm desired and cannot be obtained with a Group 6 isolation, present:

[ ] a. In Isolation Relay Cabinet A (Cable Spreading Room NE wall), lift and tape Lead TB-1, Terminal 19/SW 650-30.

[ ] b. Throttle SW-MO-650 to maintain SW Subsystem A flow of 400 gpm.

[ ] 1.2.3 While maintaining REC header pressure ≥ 62 psig on REC-PI-452, slowly throttle open REC-MO-712, HX A OUTLET VLV. N/A if both REC HXs are in service.

[ ] 1.2.4 If both REC HXs in service, perform following:

[ ] 1.2.4.1 Open REC-19, REC HX B INLET (R-931-N).

[ ] 1.2.4.2 Open REC-21, REC HX A INLET (R-931-N).

[ ] 1.2.5 Ensure REC-MO-713, HX B OUTLET VLV, closed.

[ ] 1.2.6 Ensure SW-MO-651, REC HX B SERVICE WATER OUTLET, closed.

[ ] 1.2.6.1 If Group 6 isolation signal present, at REC-TIC-451B, SW TO REC HX B (R-931-NE), place controller to MANUAL and close.

[ ] 1.2.7 Position tags to indicate REC HX A in service and REC HX B in standby.

[ ] 1.3 Place REC HX B in service as follows:

[ ] 1.3.1 Ensure SW-TCV-451B, REC HX B SW OUTLET TEMPERATURE CONTROL, switch in OPEN.

[ ] 1.3.2 Throttle SW-MO-651, REC HX B SERVICE OUTLET, to maintain SW Subsystem B pressure ≥ 38 psig on SW-PI-2715B or until flow through valve is 400 gpm if SW pressure < 38 psig and REC non-critical loops are isolated.

[ ] 1.3.2.1 If 400 gpm desired and cannot be obtained with a Group 6 isolation, present:

[ ] a. In Isolation Relay Cabinet B (Cable Spreading Room NE wall), lift and tape Lead TB-1, Terminal 8/SW 651-30.

[ ] b. Throttle SW-MO-651 to maintain SW Subsystem B flow of 400 gpm.

[ ] 1.3.3 While maintaining REC header pressure ≥ 62 psig on REC-PI-452, slowly throttle open REC-MO-713, HX B OUTLET VLV. N/A if both REC HXs in service.

[ ] 1.3.4 If both REC HXs in service, perform following:

[ ] 1.3.4.1 Open REC-19, REC HX B INLET (R-931-N).

[ ] 1.3.4.2 Open REC-21, REC HX A INLET (R-931-N).

[ ] 1.3.5 Ensure REC-MO-712, HX A OUTLET VLV, closed.

[ ] 1.3.6 Ensure SW-MO-650, REC HX A SERVICE WATER OUTLET, closed.

[ ] 1.3.6.1 If Group 6 isolation signal present, at REC-TIC-451A, SW TO REC HX A (R-931-NE), place controller to MANUAL and close.

[ ] 1.3.7 Position tags to indicate REC HX B in service and REC HX A in standby.

[ ] 1.4 Use demineralized water, if necessary, to cool one REC heat exchanger:

[ ] 1.4.1 Close SW-V-195, SW/DW CROSSTIE TELL-TALE DRAIN (R-931-N).

[ ] 1.4.2 Open DW-V-145, REC HXS SUPPLY (R-931-N).

[ ] 1.4.3 If cooling REC HX A:

[ ] 1.4.3.1 Ensure SW-V-132, REC HX A INLET, closed (R-931-N).

[ ] 1.4.3.2 Ensure SW-V-133, REC HX A OUTLET, closed (R-931-N).

[ ] 1.4.3.3 Ensure SW-V-135, REC HX A BACKWASH OUTLET, closed (R-931-N).

[ ] 1.4.3.4 Open SW-V-136, SW/DW CROSSTIE, REC HX A FLUSH (R-931-N).

[ ] 1.4.3.5 While performing Step 1.4.3.6, monitor DW transfer Pump 1A/1B discharge pressure on DW-PI-702A/B (WT-903) and ensure pressure maintained ≥ 90 psig.

[ ] 1.4.3.6 Slowly throttle open SW-V-133.

[ ] 1.4.4 If cooling REC HX B:

[ ] 1.4.4.1 Ensure SW-V-123, REC HX B INLET, closed (R-931-N).

[ ] 1.4.4.2 Ensure SW-V-124, REC HX B OUTLET, closed (R-931-N).

[ ] 1.4.4.3 Ensure SW-V-126, REC HX B BACKWASH OUTLET, closed (R-931-N).

[ ] 1.4.4.4 Open SW-V-127, SW/DW CROSSTIE, REC HX B FLUSH (R-931-N).

[ ] a. While performing Step 1.4.4.4b, monitor DW transfer Pump 1A/1B discharge pressure on DW-PI-702A/B (WT-903) and ensure pressure maintained ≥ 90 psig.

[ ] b. Slowly throttle open SW-V-124.

[ ] 1.4.5 Contact Ionics Operator to makeup demineralized water to demineralized water storage tank, as necessary.

[ ] 1.4.6 Secure all unnecessary usage of demineralized water.

[ ] 1.5 When directed by CRS, restore SW 650 Group 6 logic:

[ ] 1.5.1 (Independent Verification) In Isolation Relay Cabinet A (Cable Spreading Room NE wall), re-land Lead TB-1, Terminal 19/SW 650-30.

Performed By: _____

Verified By: _____

[ ] 1.6 When directed by CRS, restore SW 651 Group 6 logic:

[ ] 1.6.1 (Independent Verification) In Isolation Relay Cabinet B (Cable Spreading Room NE wall), re-land Lead TB-1, Terminal 8/SW 651-30.

Performed By: _____

Verified By: _____.

1. LOW RIVER LEVEL

[ ] NOTE - Actual level in E Bay should be determined by sounding bay. Floor elevation of Intake Structure is 903'6".

[ ] 1.1 At river level 873', perform following:

[ ] 1.1.1 Commence monitoring river level and E Bay level on an hourly basis and record on Attachment 5.

[ ] 1.1.2 If river level forecast to reach 865', shut down the plant per Procedure 2.1.4.

[ ] 1.1.3 Ensure guide wall gate, OPA-GATE-1, has been removed per Procedure 7.2.80 before river level drops to ≤ 872'.

[ ] 1.2 At a river level ≤ 872', perform following:

[ ] 1.2.1 Rapid power reduction per Procedure 2.1.10.

[ ] 1.2.2 Remove CW pumps from service per Procedure 2.2.3, as necessary, to maintain E Bay > 867'

[ ] NOTE - Checked By is performed by a Licensed Operator.

[ ] 1.2.2.1 (Checked By) If reactor power > 30%, subtract 5.5" Hg from current barometric pressure, PMIS Point F083. If PMIS Point for F083 unavailable, substitute 30" Hg.

[ ] a. _____" Hg - 5.5" Hg = _____" Hg

Performed By: _____

Checked By: _____

[ ] 1.2.2.2 **If vacuum cannot be recovered to ≥ value determined in Step 1.2.2.1a within 5 minutes, perform following:**

[ ] a. **SCRAM and enter Procedure 2.1.5.**

[ ] 1.2.2.3 If reactor power < 30% and vacuum cannot be recovered to ≥ 3.5" HgA within 5 minutes:

[ ] a. **If Annunciator 9-5-2/C-4, TSV & TCV CLOSURE TRIP BYP CHAN A/B, is clear, SCRAM and enter Procedure 2.1.5.**

[ ] b. Trip main turbine.

[ ] c. If reactor not scrammed, enter Procedure 2.2.77 as dictated by plant conditions.

[ ] 1.2.3 Place ELECTRIC FIRE PUMP C switch to PULL-TO-LOCK per Procedure 2.2.30.

[ ] 1.2.4 Move Flygt pumps near river and prepare them for insertion into river.

[ ] 1.3 At river level 865' with guide wall gate removed or 872' with guide wall gate installed:

[ ] 1.3.1 Enter Condition and Required Action of Technical Specification LCO 3.7.2, Condition B

[ ] 1.3.2 **If E Bay cannot be maintained > 865', perform following:**

[ ] 1.3.2.1 **SCRAM and enter Procedure 2.1.5.**

[ ] 1.3.2.2 Trip main turbine.

[ ] 1.3.2.3 Rapidly reduce reactor pressure to 500 to 600 psig using main turbine BPV's per Procedure 2.2.77.1.

[ ] 1.3.2.4 Close MSIV's.

[ ] 1.3.2.5 Ensure SW-MO-37, LOOP CROSSTIE VLV, is closed.

[ ] 1.3.2.6 Ensure SW-MO-36, LOOP CROSSTIE VLV, is closed.

[ ] 1.3.2.7 Verify which REC HX is in service and perform following:

[ ] a. Remove all but one SW pump from service.

[ ] 1.3.2.8 Calculate RPV cooldown rate and continue normal reactor cooldown within cooldown limits

[ ] 1.3.2.9 Enter Procedure 2.4TEC.

[ ] NOTE - Step 1.3.3 intended to preserve one SW pump for future operation should running other SW pumps at river level < 865' result in pump damage.

[ ] 1.3.3 Caution Tag a non-running SW pump such that it should not be run until one of following conditions exist

[ ] 1.3.3.1 E Bay level > 865'

[ ] 1.3.3.2 There are no other available SW pumps to maintain SW System flow

[ ] 1.3.4 Open CW-V-935 CROSSTIE GATE BETWEEN D & E (IS-SWP-RM)

[ ] 1.3.5 Monitor SW pumps for cavitation

[ ] NOTE - If E Bay drops below 865' SW pump cavitation possible

[ ] 1.3.6 If SW pump cavitation observed

[ ] 1.3.6.1 Estimate SW System flow on Attachment 3

[ ] 1.3.6.2 Start or stop additional SW pumps to maintain operating range of Attachment 3

[ ] a Flow on Attachment 3 should be estimated anytime E Bay level changes by 0.5'

[ ] 1.3.6.3 Enter Procedure 5.2REC to reduce REC System loads as much as possible

[ ] 1.3.6.4 Reduce SW flow to REC System as much as possible per Attachment 1 of this procedure

[ ] **NOTE** - Plant not required to be in cold shutdown to perform Step 1.3.6.5.

[ ] 1.3.6.5 If RHR HX SW flow is required, establish 1800 gpm SW flow to RHR SW System per establishing RHR SW flow without SWBPs running section of Procedure 2.2.70.

[ ] 1.3.7 If SW pump cavitation still occurring:

[ ] 1.3.7.1 Remove A through E Bay Traveling Screens from service per Procedure 2.2.3.1.

[ ] 1.3.7.2 Remove screen wash pumps from service per Procedure 2.2.3.1.

[ ] 1.3.7.3 Remove sparger pumps from service per Procedure 2.2.3.1.

[ ] 1.3.7.4 Align E Bay Traveling Screens and Spargers to SW and start E Bay Traveling Screens, if required, per Procedure 2.2.3.1.

[ ] 1.3.7.5 If available, ensure Station Air Compressor A running per Procedure 2.2.59

[ ] a. If Station Air Compressor A not available:

[ ] 1. Line up REC cooling to Station Air Compressor B or C per Procedure 2.2.76.

[ ] 2. After Station Air Compressor B or C has been lined-up to REC, start compressor per Procedure 2.2.59

[ ] 1.3.7.6 Shift Control Room Air Conditioner cooling water supply from TEC System to SW System per Procedure 2.2.76.

[ ] 1.3.7.7 Ensure SW-MO-36, LOOP CROSSTIE VLV, closed.

[ ] 1.3.7.8 Ensure SW-MO-37, LOOP CROSSTIE VLV, closed.

[ ] 1.4 If SW System supplying following loads and E Bay cannot be maintained > 863', remove following components from service per Procedure 2.2.3.1:

[ ] 1.4.1 E Bay Traveling Screen.

[ ] 1.4.2 SW to E Bay Traveling Screen and E Bay Spargers.

[ ] 1.5 If E Bay level cannot be maintained > 863, have Maintenance perform following:

[ ] 1.5.1 Lower Flygt pumps into river side of guide wall.

[ ] 1.5.2 Route discharge tube of Flygt pumps into Intake Structure forebay and lower discharge end of tube as low as possible to take advantage of any available static recovery (siphon).

[ ] 1.5.3 Caution Tag Screen Wash Pump A or B switch to OFF while Flygt pumps are connected to 480V Bus 1E to prevent overloading 480V Bus 1E.

[ ] 1.5.4 Connect leads for Flygt pump starters to spare breaker on 480V Bus 1E marked FLYGT PUMP.

[ ] 1.6 At E Bay level of 862', start Flygt pumps to maintain E Bay level > 860.5'.

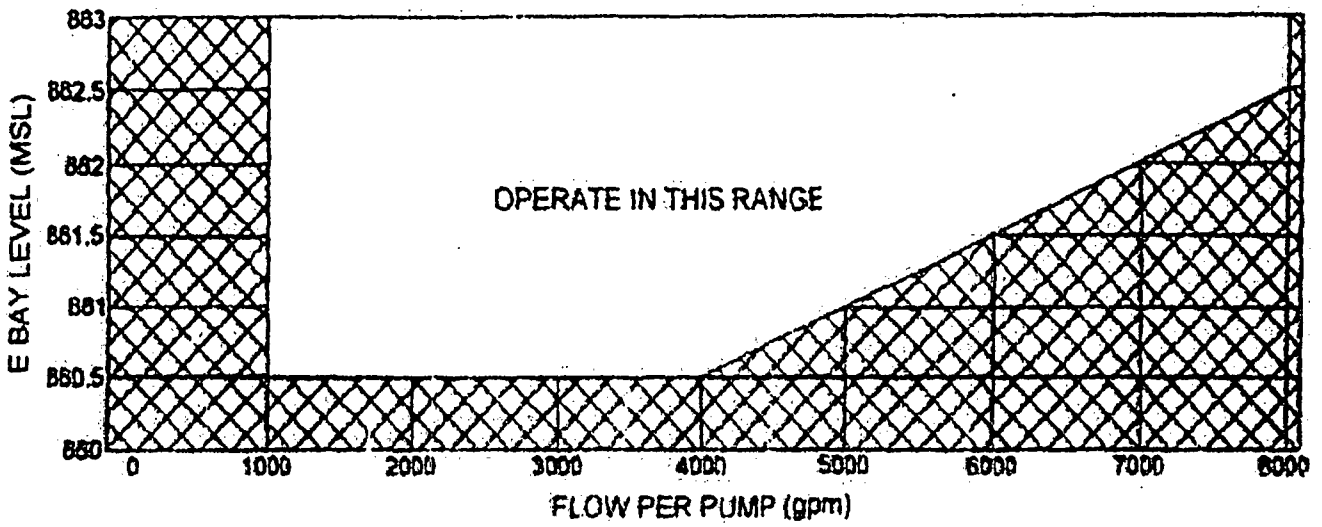

Figure 1

1. **ESTIMATING SW SYSTEM FLOW.**

[ ] 1.1 At VBD-M, add flow on SW-FI-387A and SW-FI-387B together. _____ gpm

[ ] 1.2 At Panel 9-3, add flow on SW-FI-132A and SW-FI-132B together. _____ gpm

[ ] 1.3 If SW System supplying TEC, Screen Wash, and/or Sparger Systems, contact Engineering to provide SW flow to these systems using ultrasonic flowmeter _____ gpm

[ ] 1.4 Estimate SW Strainer Blowdown at 400 gpm per operating strainer. _____ gpm

[ ] 1.5 If SW supplying DG1, valve-in SW-FI-364A per Attachment 4 and record flow. _____ gpm

[ ] 1.6 If SW supplying DG2, valve-in SW-FI-364B per Attachment 4 and record flow. _____ gpm

[ ] 1.7 Estimate flow to SW Gland Water System, RHR SW Gland Water System, Control Room A/C, FC-C-1A at 75 gpm total if any are being supplied by SW System. _____ gpm

[ ] 1.8 Added flows in Lines 1.1 through 1.7 together. _____ gpm

[ ] 1.9 Divide flow on Line 1.8 by number of operating SW pumps. _____ $\frac{\text{gpm}}{\text{pump}}$

[ ] 1.10 Ensure flow per pump on Line 1.9 vs. E Bay level is in operating range.

ATTACHMENT 4 DG FLOW INSTRUMENTS

1. DG FLOW INSTRUMENTS

[ ] 1.1 Valve-in SW-FI-364A, DIESEL GEN #1 SW FLOW IND (DG1 Room north wall):

[ ] 1.1.1 Ensure SW-V-1345, FI-364A EQUALIZER, open.

[ ] 1.1.2 Open SW-V-1343, FI-364A LOW SIDE SHUTOFF.

[ ] 1.1.3 Close SW-V-1345.

[ ] 1.1.4 Open SW-V-1344, FI-364A HIGH SIDE SHUTOFF.

[ ] 1.2 Valve-in SW-FI-364B, DIESEL GEN #2 SW FLOW IND (DG2 Room north wall):

[ ] 1.2.1 Ensure SW-V-1352, FI-364B EQUALIZER, open

[ ] 1.2.2 Open SW-V-1351, FI-364B LOW SIDE SHUTOFF.

[ ] 1.2.3 Close SW-V-1352

[ ] 1.2.4 Open SW-V-1350 FI-364B HIGH SIDE SHUTOFF

Date: _____

TIME	E BAY (MSL')	RIVER (MSL')
0000		
0100		
0200		
0300		
0400		
0500		
0600		
0700		
0800		
0900		
1000		
1100		
1200		
1300		
1400		
1500		
1600		
1700		
1800		
1900		
2000		
2100		
2200		
2300		

Shift Manager: _____