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GEORGIA POWER
POWER GENERATION DEPARTMENT
VOGTLE ELECTRIC GENERATING PLANT

INSTRUCTIONAL UNIT

TITLE:	RESPOND TO LOSS OF ALL AC POWER	NUMBER:	LO-IU-37031-001-01
PROGRAM:	LICENSED OPERATOR	REVISION:	1
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REFERENCES:

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PERFORMANCE OBJECTIVE

Given that reactor and turbine trip have been verified, both ac emergency busses are de-energized, and power cannot be restored to either ac emergency bus, respond to a loss of all ac power.

Actions must be taken to restore ac power, minimize the RCS inventory loss, prevent RCP seal damage, and minimize the loads on the batteries. When ac power is restored, the appropriate plant procedure must be identified. All communication and activities must be performed in accordance with current, approved procedures.

INFORMATION

This instructional unit addresses licensed operator actions necessary to respond to a loss of all ac power.

Procedure 19100, "Loss of All AC Power" governs the initial response to loss of all ac power. Procedure 19100 and the other loss of all ac power procedures (Procedures 19101 and 19202) are unique within the set of EOPs because they essentially take priority over all other EOPs except the first three steps of Procedure 19000. The guidance provided by the other EOPs does not apply when all ac power is lost because the other EOPs were written under the premise that at least one emergency bus is energized and that associated equipment can be powered from the energized ac emergency bus. Entry to Procedure 19100 occurs from step 3 of Procedure 19000 when both emergency ac busses are de-energized and the operator is unable to restore at least one ac emergency bus. If the symptoms of a loss of all ac power (all main and emergency buses de-energized) occur any time before entry into the EOPs or after the initial verification of power to the ac busses (step 3 of Procedure 19000), it is plant policy that the operators go to Procedure 19000, perform steps 1 through 3, and then go to Procedure 19100 if power cannot be restored to at least one ac emergency bus.

The primary objective of Procedure 19100 is to mitigate the deterioration of the RCS conditions while ac emergency power is not available. The procedure steps address the loss of all ac power as an initiating event. Because implementation of the FRPs is not allowed with a loss of all ac power, Procedure 19100 includes actions that monitor and maintain the Critical Safety Functions. In addition to attempts to restore ac power, Procedure 19100 contains major actions which try to prevent core damage by extending the length of time that the core remains covered. These actions include the following:

- Maintaining a secondary heat sink
- Preserving the RCP seals
- Minimizing the RCS inventory loss

- Extending the life of the batteries

There are several key decision points in Procedure 19100 which concern dispatching personnel to perform local operations that cannot be performed from the control room because of the loss of ac power. These decision points are complicated by the availability and accessibility of equipment, the availability of personnel and communications to conduct local operations, and personnel safety considerations. The capability of local operation must be evaluated before personnel are dispatched to:

- restore ac emergency power. (step 5e)
- close valves to isolate the RCP seals. (step 8)
- close valves to isolate the condensate storage tank. (step 9)
- close valves to isolate the steam generators. (step 10)
- monitor the DC power supply. (step 14)
- switch to an alternate AFW water supply. (step 15)
- dump steam from the steam generators. (steps 16, 17, and 24)
- close valves to isolate containment. (steps 19-22)
- reduce the boron concentration in the auxiliary boration systems. (step 23)
- provide makeup to the spent fuel pool. (step 23)

Although the procedure addresses the feasibility of local operation, the operator must decide if personnel are available and plant conditions permit local operation.

Responding to a Loss of All AC Power

OVERVIEW: Steps 1-4 are immediate operator actions and must be committed to memory. Note that analysis has shown that all of these actions are appropriate for all loss of ac power events.

PROCEDURE STEPS 1 and 2 (19100)

ACTIONS: Verify that the reactor and turbine are tripped.

INTENT: You will have just verified reactor and turbine trip in Procedure 19000. The reactor must be tripped to ensure that the only heat being added to the RCS is decay heat. The turbine is tripped to prevent an uncontrolled cooldown of the RCS.

PROCEDURE STEP 3 (19100)

ACTION: Isolate all RCS outflow paths.

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INTENT: RCS inventory depletion must be minimized to increase the time before the core is uncovered. A check for RCS isolation is included as an immediate action step to minimize the RCS inventory loss. The valves listed are those in major RCS outflow lines that could contribute to rapid depletion of the RCS inventory.

The following sequence for checking the valves is based upon the capacity of the outflow lines.

- Pressurizer PORVs.

  Because the turbine-driven AFW pump should be running, the secondary side is removing decay heat and the RCS pressure should be under the pressurizer PORV set point.

- Letdown line isolation valves adjacent to the RCS loop.

  These valves are normally open and receive a low pressurizer level isolation signal. If these valves and the letdown orifice isolation valves remain open, a leak path to the pressurizer relief tank (PRT) through the letdown line relief valve may exist. If necessary, manually close these valves, including the letdown orifice isolation valves, as soon as possible to isolate the letdown line and minimize the RCS inventory loss before the RCS is automatically isolated on a low pressurizer level. Note that isolating the letdown line at the containment penetration will not isolate the letdown relief valve leak path to the PRT.

- Excess letdown line isolation valves adjacent to the RCS loop.

  These valves are normally closed and do not receive a low pressurizer level isolation signal. If these valves are open, a leak path to the PRT through the RCP seal return relief valve may exist. Close these valves to isolate the excess letdown line. Note that isolating the seal return line at the containment penetration will not isolate excess letdown inventory loss to the PRT through the seal return relief valve.

- Reactor vessel head vent isolation valves

  These valves are normally closed and do not receive a low pressurizer level isolation signal. If these valves are open, a leak path to the PRT may exist.

- RCS sample valves

These valves are normally closed and do not receive a low pressurizer level isolation signal. If these valves are open, a leak path to the CVCS may exist.

Following the completion of this step, the only RCS inventory leakage path should be the RCP controlled leakage seals. The secondary depressurization in step 16 will minimize the RCS inventory loss by reducing the RCS pressure, which will terminate or minimize any possible relief valve flow. For example, reducing the RCS pressure to 400 psig would permit the letdown line relief valve to close and would minimize the flow through the excess letdown relief valve.

PROCEDURE STEP 4 (19100)

ACTION: Verify that the AFW flow is adequate.

INTENT: Following a loss of all ac power, the TDAFW pump is the only source of makeup to the steam generators; the steam supply valves to the turbine-driven AFW pump should automatically open and the pump should start to supply AFW to the steam generators. All AFW throttle valves will also receive an open signal to support the TDAFW pump operation.

Verify that the AFW flow to the steam generators is equal to the minimum safeguards AFW flow requirement for heat removal. This flow is sufficient to ensure that an effective secondary heat sink can be maintained. If necessary, check the alignment of the TDAFW pump steam supply valves and the AFW valves to establish the required flow.

NOTE: The Emergency Director will implement Procedure 91001, "Emergency Classification and Implementing Procedure."

OVERVIEW: Procedure steps 5 and 7 are designed to restore ac power.

PROCEDURE STEP 5 (19100)

ACTION: Try to restore power to any ac emergency bus.

INTENT: Quickly restoring power to an ac emergency bus from the control room will allow automatic sequencing of the required loads onto the bus before plant conditions deteriorate. If ac power is restored during this step, it will probably be restored through a stable power supply such as a diesel generator. If a running diesel generator cannot be loaded, it should be tripped to protect it from damage caused by the loss of diesel generator support auxiliaries such as NSCW. If at least one ac emergency bus can be restored at this point, return to the procedure and step in effect.

Until ac power is restored, plant conditions will deteriorate because of RCP seal leakage. To minimize the deterioration of plant conditions, begin recovery actions with step 24 as soon as ac power is restored. Note that The SI signal must be reset so that the safety injection equipment will not automatically actuate if ac power is restored.

OVERVIEW: Steps 6 and 8-23 of Procedure 19100 are designed to mitigate the consequences of a loss of all ac power and to prepare for ac power restoration. These actions continue in a loop until ac power is restored.

PROCEDURE STEP 6 (19100)

ACTION: Defeat the automatic loading of large loads onto the ac emergency bus.

INTENT: Local actions to restore ac power may result in ac power restoration by means of a temporary power supply. As the duration of the ac power outage lengthens, it is more likely that the automatic start of equipment when ac power is restored will have detrimental effects on the restored ac emergency bus, the automatically started equipment, or other plant equipment.

Defeating the automatic loading of as many large loads as practical is intended to avoid overloading the energized ac emergency bus. This action allows you to evaluate the status of the restored emergency bus and to sequence loads onto the bus consistent with the bus status and plant conditions. The NSCW switches are not placed in the PULL-TO-LOCK position; this allows the two NSCW pumps to automatically load onto the ac emergency bus to provide diesel cooling in case the diesels have started. Small loads, such as the 480-volt ac busses, are also permitted to automatically load on the restored ac emergency bus. These small loads will help you determine the plant status. Restricting the automatic loading to this equipment limits the initial demand on the ac emergency bus.

Defeating the automatic loading of the charging pumps also functions to protect the RCP seals from damage when ac power is restored. This action prevents the automatic delivery of relatively cold seal injection flow into the RCP number 1 seal chamber and shaft area and prevents thermal shock and subsequent damage to the RCP seals and shaft.

Defeating the automatic loading of other major equipment also functions to protect the respective equipment. This allows you to verify the valve alignments before starting the pumps.

PROCEDURE STEP 7 (19100)

ACTION: Send an operator to locally restore the AC buses.

INTENT: If you cannot restore ac power from the control room, ac power must be restored through local actions. While the operator is attempting to locally restore ac power, continue with the subsequent steps to prevent deterioration of RCS conditions. When one ac emergency bus is energized during steps, then go to procedure step 24 to verify proper loading of equipment onto the bus.

PROCEDURE STEP 8 (19100)

ACTION: Locally isolate the RCP seals, located in the "A" and "B" train penetration rooms of A Level in the Auxiliary Building.

INTENT: This step groups three actions, with different purposes, aimed at isolating the RCP seals. The actions are grouped because all require an operator dispatched from the control room to locally close the containment isolation valves.

Isolating the RCP seal injection lines prepares the plant for recovery while protecting the RCPs from seal and shaft damage that may occur when a charging pump is started as part of the recovery. With the RCP seal injection lines isolated, a charging pump can be started in the normal charging mode without thermal shock to the RCPs from cold seal injection flow. Seal injection can subsequently be established to the RCP consistent with the appropriate plant procedures.

Isolating the seal return line prevents seal leakage from filling the VCT (through seal return relief valves outside containment) and subsequently transferring to other auxiliary building holdup tanks (through the VCT relief valve) with the possibility of radioactive release within the auxiliary building. Such a release, without auxiliary building ventilation available, could limit personnel access for local operations.

Isolating the RCP thermal barrier ACCW return isolation valve outside containment (located in the south main steam valve room, on the mezzanine, above the MFIVs) prepares the plant for recovery while protecting the ACCW system from steam formation caused by RCP thermal barrier heating. Following the loss of all ac power, hot reactor coolant will gradually replace the normally cool seal injection water in the RCP seal area. As the hot reactor coolant leaks up the shaft, the water in the thermal barrier will heat up and possibly form steam in the thermal barrier and in the ACCW lines adjacent to the thermal barrier. A subsequent automatic start of the ACCW pump would deliver ACCW flow to the thermal barrier, flushing the steam into the ACCW system. If abnormal RCP seal leakage had developed in a pump, the abnormally high leakage rate could exceed the cooling capacity of the ACCW flow to that pump's thermal barrier and tend to generate more steam in the RCP thermal barrier ACCW return lines.

Isolating these lines prevents the introduction of this steam into the main portion of the ACCW system (available for cooling equipment that is necessary for plant recovery when the ac power is restored).

PROCEDURE STEP 9 (19100)

ACTION: Isolate the CST to preserve AFW inventory for continued steam generator heat removal.

INTENT: Verify that a dedicated supply of AFW exists for delivery to the steam generators. The CST is the normal source of AFW. However, following a loss of all ac power, the CST may drain through unisolated lines to the condenser hotwell.

PROCEDURE STEP 10 (19100)

ACTION: Check the steam generators.

INTENT: Verify that the steam generator main steam, main feedwater, blowdown, and sample lines are isolated. Manually shut the valves if necessary. This ensures the optimal use of the AFW for steam generator heat removal.

Maintain the steam supply to the TDAFW pump from at least one steam generator. Subsequent steps address isolating faulted or ruptured steam generators and controlling the level and pressure in the intact steam generators. This maximizes operator control of secondary pressure and minimizes radioactivity release to the environment. Because the only source of makeup to the steam generators is the TDAFW pump, steam supply must be maintained to the pump from at least one steam generator even if both steam generators that supply steam are either ruptured or faulted.

PROCEDURE STEP 11 (19100)

ACTION: Check for faulted steam generators.

INTENT: Isolate any steam generator that appears to be faulted so that it will not affect the subsequent recovery operations to depressurize and stabilize the RCS at conditions consistent with minimizing the RCS inventory loss.

PROCEDURE STEP 12 (19100)

ACTION: Check for ruptured steam generator tubes.

INTENT: If condenser air ejector, steam generator sample, main steamline, or steam generator blowdown radiation is detected, a steam generator tube rupture is possible. The identification and isolation technique employed in this procedure is consistent with the steam generator tube rupture procedure. Actual identification and isolation of a steam generator tube rupture may not be accomplished until step 13, when you attempt to control the AFW flow to maintain the steam generator level. Secondary depressurization in step 16 will function to terminate any radioactive steam release from the ruptured steam generator.

PROCEDURE STEP 13 (19100)

ACTION: Check the intact steam generator levels to verify an adequate sink.

INTENT: Maximum AFW flow is maintained until the narrow range level is established in at least one steam generator. The flow is increased to the maximum to quickly restore the narrow range level so that the secondary depressurization in step 16 can be performed as soon as possible.

Once the level is in the narrow range, AFW flow is controlled to maintain that level. If the level in one steam generator continues to increase after the AFW flow to the steam generator is isolated, a steam generator tube rupture may exist. Isolate the ruptured steam generator to minimize the release of radioactive steam. A small leak will be difficult to detect because it will be masked by AFW flow and because the ECCS pump flow will not be available to maintain the RCS-to-secondary leakage.

PROCEDURE STEP 14 (19100)

ACTION: Conserve dc power supplies by shedding nonessential dc loads from the dc busses as soon as practical.

INTENT: Because ac emergency power is not available to charge the station batteries, conserve the battery power supply so that the plant can be monitored and controlled until ac power can be restored. Remove all large nonessential loads as soon as practical to prevent damage to plant equipment. Because the remaining battery life cannot be monitored from the control room, personnel should be dispatched to locally monitor the DC power supplies. This will provide information on the remaining battery life and the need to shed additional loads.

PROCEDURE STEP 15 (19100)

ACTION: Verify that the CST level is greater than 15 percent.

INTENT: This ensures a long-term supply of water for the AFW system operation. If the CST level is low, transfer the TDAFW pump to the alternate CST. The transfer operation may require local actions following a loss of ac power.

CAUTION: Keep the steam generator pressure above 165 psig. The steam generator pressure limit is based upon the nominal steam generator pressure to preclude nitrogen addition, minus allowances for normal steam generator pressure channel accuracy. Instrumentation accuracy is subtracted from the nominal pressure to ensure that water delivery to the RCS is maximized.

Maintain SG narrow range level greater than 5%. This ensures that a secondary heat sink is maintained at all times during the depressurization.

NOTES: The steam generators should be depressurized as quickly as possible to minimize the RCS inventory loss. Controllability is required to ensure that steam generator pressures do not undershoot the specified limit. If the operator can control the secondary depressurization from the control room, the maximum rate means that the steam generator ARVs are fully open. If secondary depressurization is performed by local actions, the control room and local operators must determine the maximum rate based upon the plant conditions and available communications. A slower rate is acceptable for locally controlled secondary depressurization.

Secondary depressurization should not be limited by the technical specification RCS cooldown limit of 100° F/hour. Do not stop the steam generator depressurization even if the pressurizer level goes off-scale low or reactor vessel upper head void formation occurs. These conditions are anticipated and should not interfere with actions in step 16 to depressurize the steam generators to reduce the RCS pressure and temperature and to minimize the RCS inventory loss through the RCP seals.

PROCEDURE STEP 16 (19100)

ACTION: Depressurize the intact steam generators.

INTENT: This reduces the RCS temperature and pressure, reducing the RCP seal leakage and minimizing the RCS inventory loss. Because there is no cooling to the seals, the failure of the seals and a loss of RCS inventory are likely if the RCS pressure is held to normal values. During the steam generator depressurization, the level in at least one steam generator must be maintained above the top of the U-tubes. This will ensure that sufficient heat transfer capability exists to remove heat from the RCS through either natural circulation or reflux boiling after the RCS saturates.

Once depressurization has begun, maintaining a specified rate is not critical. The depressurization must not reduce the steam generator pressures in an uncontrolled manner, which might undershoot the pressure limit and allow possible introduction of nitrogen from the accumulators into the RCS. The initial depressurization should be at the maximum possible rate, and should be reduced when the pressure is within 100 psig of the target pressure.

During the steam generator depressurization, it may be necessary to increase the AFW flow to maintain the required steam generator narrow range level. Establish full AFW flow to any steam generator in which the level drops out of the narrow range indication.

Monitor the RCS cold leg temperatures during the steam generator depressurization to ensure that the depressurization does not impose a challenge to the Integrity CSF. This check is included here because an FRP must not be implemented, even if there is a challenge on the CSF status trees. It is not likely that the steam generator depressurization will cause a challenge to the Integrity CSF, because the RCS cold leg temperatures are not expected to approach the temperature limit for a challenge.

Once the target steam generator pressure is reached, control the steam generator ARVs and the AFW flow to maintain the steam generator pressure at this value until ac power is restored.

The target steam generator pressure (265 psig) used here ensures that the RCS pressure is above the minimum pressure to preclude the injection of accumulator nitrogen into the RCS, which could reduce the effectiveness of natural circulation.

PROCEDURE STEP 17 (19100)

ACTION: Check for a zero or negative startup rate on the intermediate and source range channels.

INTENT: In addition to the accumulator nitrogen limitation on steam generator depressurization, there is a core criticality concern when the RCS is cooled down. An excessive RCS cooldown rate could add enough positive reactivity to return the core to criticality. If a positive startup rate is detected, terminate the secondary depressurization and allow the RCS temperature to increase to shut down the reactor.

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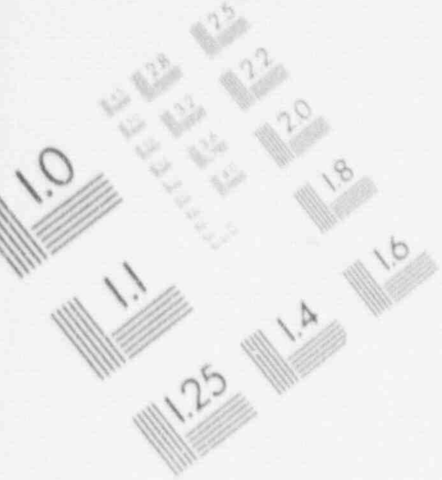
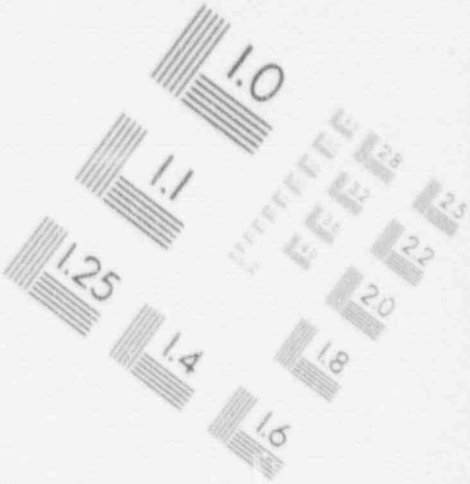
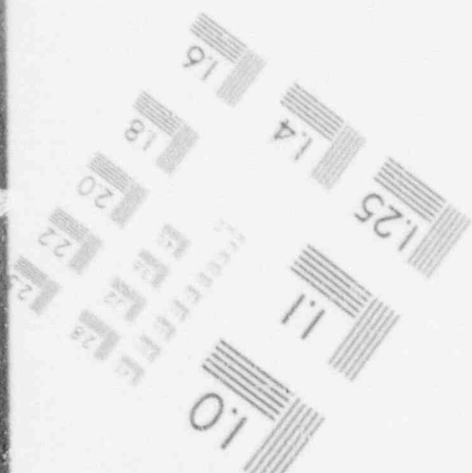
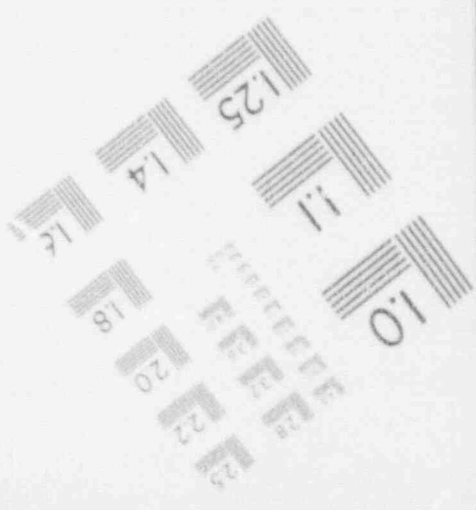
IMAGE EVALUATION TEST TARGET (MT-3)









NOTE: Reset the SI signal to allow manual loading of equipment. This provides bus overload protection in case power is restored from a low-capacity power source.

PROCEDURE STEP 18 (19100)

ACTION: Verify that safety injection has been actuated and reset the SI signal.

INTENT: The secondary depressurization begun in step 16 will cause an SI actuation on low pressurizer pressure or low steamline pressure. Check the SI actuation status and reset the SI signal as soon as the reset delay time has expired. This reset action defeats the automatic loading of the emergency bus upon ac power restoration. Resetting the SI signal will open the individual output relays from the solid state protection cabinets, allowing manual loading of the ECCS equipment as instructed in the recovery procedures.

If safety injection has not been actuated, go to step 22. If safety injection has been actuated, reset SI and perform steps 19-20 to verify containment isolation Phase A and containment ventilation isolation, because an SI signal precedes the need for containment isolation.

PROCEDURE STEP 19 (19100)

ACTION: Verify containment isolation Phase A. If necessary, manually close the valves from the control room or have them closed locally.

Most of these valves are located in the A&B train penetration rooms on Levels A&B of the Auxiliary Building.

INTENT: Isolating containment at this time functions to prepare the plant for mitigation of potential radioactive release. The containment isolation Phase A signal is latched in and is not reset by resetting the SI signal. Separate reset is provided for the containment isolation Phase A signal.

PROCEDURE STEP 20 (19100)

ACTION: Verify containment ventilation isolation. If necessary, manually close the dampers from the control room, or have them closed locally.

Located on level of the Auxiliary Building and on the East (U-1) or West (U-2) side of containment.

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INTENT: The containment ventilation isolation signal is locked in and is not reset by resetting the SI signal.

PROCEDURE STEP 21 (19100)

ACTION: Verify the proper actuation of the containment spray signal.

INTENT: Reset the containment spray signal if the RCS pressure has remained less than 21.5 psig, to keep containment spray from automatically loading onto the ac emergency busses when power is restored.

PROCEDURE STEP 22 (19100)

ACTION: Verify that containment radiation is less than 100 R/hour to determine whether all containment penetrations should be isolated.

INTENT: All containment penetrations should be isolated if containment radiation indicates a potential inadequate core cooling condition. The majority of the containment penetrations were isolated in steps 19-21. This step ensures that radioactive release from the plant is minimized by isolating all penetrations if significant radioactivity in containment is detected.

PROCEDURE STEP 23 (19100)

ACTION: Check to see if ac emergency power is restored.

INTENT: At this point, you can do no more to prevent core damage and to recover the plant until ac power is restored. This step functions as the transition between maintaining the plant without ac power and recovering plant conditions with ac power.

If power is restored to one ac emergency bus, proceed to step 24 to start recovering the plant. If ac power is not restored, control the RCS pressure and temperature conditions and monitor the plant status in preparation for eventual plant recovery.

Monitor the status of local actions being performed by personnel dispatched from the control room (to restore ac power, to isolate the RCP seals, and to monitor the DC power supply). This information is necessary to permit efficient plant recovery following ac power restoration.

BAST temperature should be monitored to ensure that BAST temperature remains above solubility limits. This will ensure that the BAST remains available for eventual plant recovery.

Monitor spent fuel cooling. Ensure that an adequate level remains in the spent fuel pit. Following the loss of all ac power, the Spent Fuel Pool Cooling System will be inoperative and the spent fuel pool water temperature will start to increase. Heat removal will occur primarily through evaporation of the water in the spent fuel pool. The rate of temperature increase and the rate of evaporation will depend upon the spent fuel pool water volume and the spent fuel pool heat load. The water temperature will continue to increase until the surface temperature reaches 212° F and boiling occurs. Boiling will continue to dissipate heat while depleting the spent fuel pool water inventory. Spent fuel heat removal and criticality should not be limiting concerns during a loss of all ac power because the minimum inventory required for personnel shielding will ensure sufficient inventory for heat removal and the evaporative heat removal mechanism does not deplete the boron content in the spent fuel pool.

Stay in the loop between steps 11 and 23, performing steps as appropriate, until ac power is restored.

Steps 24-26 of Procedure 19100 are designed to evaluate the energized ac emergency bus.

PROCEDURE STEP 24 (19100)

ACTION: Stabilize SG pressures.

INTENT: When you reach this step, power has been restored to at least one ac emergency bus. To continue recovery actions, plant conditions must be stabilized. If a steam generator depressurization is in progress, stabilize the steam generator pressures at the values existing when ac power is restored.

CAUTION: Do not exceed the capacity of the power source. Determine the status of the energized ac emergency bus so that equipment that is manually loaded onto the bus does not exceed its capacity and cause failure of the bus. Use bus voltage and frequency as indications of a stable bus, along with any information received from the local personnel who restored ac power.

PROCEDURE STEP 25 (19100)

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ACTION: Verify that the ac emergency bus has assumed any essential loads that are energized simultaneously with the emergency bus.

INTENT: These loads include instrumentation and control, emergency lighting, battery room fans and communications. Verify the loading of the 480 volt busses to assess valve alignments and the battery chargers that recharge the station batteries.

PROCEDURE STEP 26 (19100)

ACTION: Verify the automatic loading of the NSCW pumps and the NSCW valve alignments.

INTENT: This ensures cooling flow to the diesel generator (to provide cooling for the DG if it was started through local actions).

PROCEDURE STEP 27 (19100)

ACTION: Select the recovery procedure.

INTENT: To select the proper procedure, check for the following criteria:

- o RCS subcooling is greater than 24° F (38° F for adverse containment)
- o The pressurizer level is greater than 9 percent (30% for adverse containment)
- o ECCS equipment has not actuated

If all of the criteria are satisfied, transfer to Procedure 19101, "Loss of All AC Power, Recovery Without SI Required." This procedure is intended to permit a relatively normal recovery when ac power is restored before the RCS conditions have degraded due to significant loss of reactor coolant inventory. As long as the RCS is subcooled and the pressurizer level exists, the pressurizer should be able to control the RCS pressure. Saturation conditions in the reactor vessel head and the PCS hot legs will not occur until after the pressurizer level drops out of the indicated range. As long as the pressurizer level and RCS subcooling exist, the RCS is in a stable condition where nominal conditions should be restored utilizing normal operational systems.

If any criterion is not satisfied, transfer to Procedure 19102, "Loss of All AC Power Recovery with SI Required". This procedure is intended to recover the plant in the safety injection mode following sufficient degradation of the RCS conditions. Following the loss of pressurizer level or RCS subcooling, the RCS conditions have degraded sufficiently that the operator may have insufficient or conflicting indications as to plant status. In this case, plant safeguards systems should be used in the safety injection mode to restore stable RCS conditions and recover the plant.

If ac power is restored after an SI signal actuation but before the SI signal is reset, the SI signal may automatically load safeguards equipment onto the emergency bus. If this occurs, implement Procedure 19102 and recover the plant in the safety injection mode.

PERFORMANCE GUIDE

The following actions are required to respond to a loss of all ac power.

- o Perform the immediate operator actions of Procedure 19100. (procedure steps 1-4)
- o Attempt to restore ac power. (procedure steps 5 and 7)
- o Perform actions to mitigate the consequences of the loss of all ac power and prepare for ac power restoration. (procedure steps 6 and 8-23).
- o Evaluate the energized ac emergency bus. (procedure steps 24-26)
- o Select the recovery procedure after ac power has been restored. (procedure step 27)

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SELF-TEST

Before proceeding the the Task Practice, answer the following questions as completely as possible.

1. When all ac power is lost, guidance provided by EOPs other than the loss of ac procedures does not apply because

   a. a loss of all ac power presents an immediate, severe challenge (red condition) to all CSFs.
   b. the other EOPs require the operation of the emergency diesel generators.
   c. the other EOPs assume that at least one emergency bus is energized.
   d. all control room and local indications and controls necessary to perform the other EOPs will be lost on a loss of ac power

2. You respond to a reactor trip. You perform the first four immediate actions of Procedure 19000 and determine that safety injection has neither occurred or is required. While performing Procedure 19001, the symptoms of a loss of all AC power occur (all normal and emergency ac buses are de-energized). Which of the following is the correct course of action per plant policy?

   a. Go to step 1 of Procedure 19101, "Loss of All AC Power Recovery Without SI Required"
   b. Go to step 1 of Procedure 19100, "Loss of All AC Power"
   c. Return to step 1 of Procedure 19000, "Reactor Trip or Safety Injection"
   d. Return to step 1 of Procedure 19001, "Reactor Trip Response"

3. The primary objective of Procedure 19100 is to

   a. mitigate the deterioration of the RCS conditions while ac emergency power is not available.
   b. use normal operational systems to stabilize plant conditions following restoration of ac emergency power.
   c. use engineered safeguards systems to recover plant conditions following restoration of ac emergency power.
   d. prevent a return to criticality from the uncontrolled RCS cooldown which is expected with a loss of all ac power event.

4. During a loss of all ac power, you are depressurizing an intact steam generator. At which of the following should you REDUCE the depressurization rate?

   a. The pressurizer level goes off-scale low
   b. Reactor vessel upper head void formation occurs
   c. Secondary depressurization exceeds the technical specification RCS cooldown limit of 100° F/hour
   d. Pressure is within 100 psig of the target pressure.

5. Following a loss of ac power, you restore power to an ac emergency bus and complete the remaining steps of Procedure 19100. Containment pressure is normal. You check RCS subcooling, pressurizer level, and ECCS equipment to determine the correct recovery procedure. The following conditions exist:

   o RCS subcooling is 30° F
   o Pressurizer level is 30%
   o ECCS equipment has not actuated

   Which of the following is the correct recovery procedure?

   a. Procedure 19101, "Loss of All AC Power Recovery Without SI Required"
   b. Procedure 19102, "Loss of All AC Power Recovery with SI Required"
   c. Procedure 19100, "Loss of All AC Power" (19100 is repeated)
   b. Procedure 19000, "Reactor Trip or Safety Injection" (19000 is repeated)

LO-IU-37031-001-01: Respond to Loss of all AC Power

ANSWERS

1. c. the other ECPs assume that at least one emergency bus is energized.
2. c. Return to step 1 of Procedure 19000, "Reactor Trip or Safety Injection"
3. a. mitigate the deterioration of the RCS conditions while ac emergency power is not available.
4. d. Pressure is within 100 psig of the target pressure.
5. a. Procedure 19101, "Loss of All AC Power Recovery Without SI Required"

TASK PRACTICE

1. Review Procedure 19100. Be sure that you understand all of the notes, cautions, and steps associated with responding to a loss of all ac power.

2. Take this instructional unit and Procedure 19100 to the control room or simulator. Be sure that you can locate all instrumentation associated with responding to a loss of all ac power.

3. In the control room or simulator, simulate responding to a loss of all ac power. If possible, have a fellow trainee evaluate your performance using Procedure 19100 and this instructional unit.

FEEDBACK ON TASK PRACTICE

1. If you have any questions about the notes, cautions, or steps in Procedure 19100, ask your instructor.

2. You should have been able to locate all instrumentation associated with responding to a loss of all ac power. If you had any difficulty, ask your instructor for help.

3. You should have simulated the steps necessary to respond to a loss of all ac power. If you had any difficulty, re-read the pertinent sections of this instructional unit and the procedure. Resolve any questions with your instructor.