

2-133B  
Georgia Power  
POWER GENERATION DEPARTMENT  
VOGTLE ELECTRIC GENERATING PLANT

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INSTRUCTIONAL UNIT

1 of 2

TITLE: RESPOND TO EMERGENCY DIESEL GENERATOR  
JACKET WATER SYSTEM ALARMS NUMBER: NL-IU-11203-00-C-002

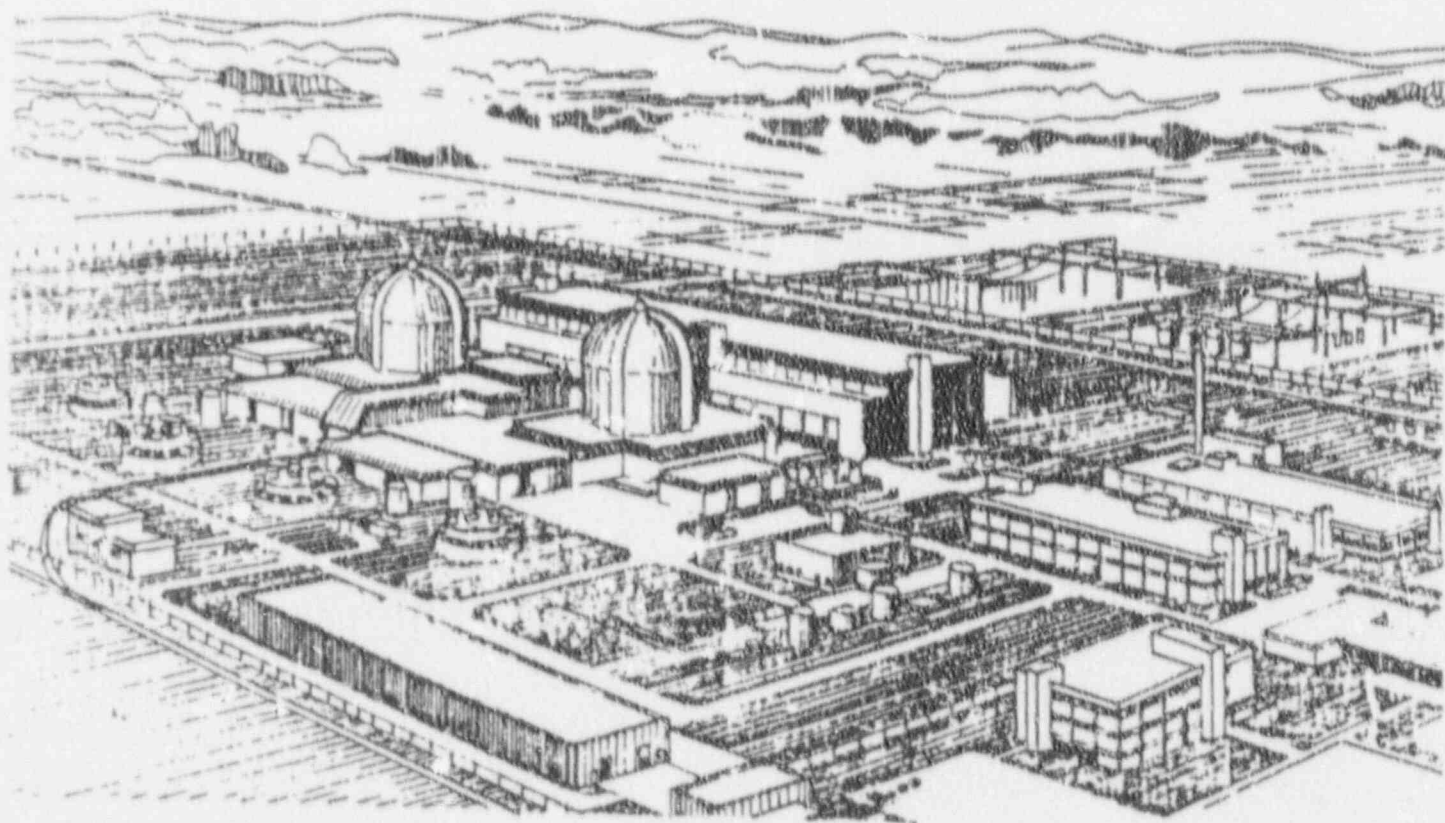
PROGRAM: OUTSIDE AREA OPERATOR REVISION: 0

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REFERENCES:

VOGTLE PROCEDURE 17035-1 ANNUNCIATOR RESPONSE PROCEDURES (REV 3)



STUDENT \_\_\_\_\_

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### PERFORMANCE OBJECTIVE

Given a directive from the control room, respond to diesel generator Jacket Water System alarms.

All communication and activities must be performed in accordance with current, approved procedures. The alarm must be acknowledged and its validity determined. Actions must be taken to correct the condition causing the alarm.

### INFORMATION

The control room operator will obtain Plant Vogtle Annunciator Response Procedure 17035-1 (17038-1 for "B" diesel generator), and issue a directive to respond to the alarm. Acknowledge the alarm and determine if it is valid. Notify the control room operator of the status of the alarm (valid or invalid) and wait for further instructions. The annunciator panel in the control room for which annunciator response procedure 17035-1 (17038-1) was written, is similar to the annunciator panel located at the engine control panel.

The control room operator will issue instructions for investigative and corrective actions to be performed as outlined in the procedure. If there are multiple alarms, the control room operator will also determine which alarm should be investigated first. After the investigation is complete and the conditions have been corrected, reset the alarm.

### DIESEL GENERATOR JACKET WATER SYSTEM

The two main circuits in the Jacket Water System are the jacket water keep-warm circuit and the engine-driven jacket water pump circuit.

The jacket water keep-warm pump is electrically driven when the engine is not running. The jacket water heater uses a thermostat to keep the water in the Jacket Water System at a constant temperature. This, in turn, keeps the jacket water at a constant temperature to keep the diesel engine warm in the STANDBY (not running) mode.

The jacket water pump takes suction from the jacket water standpipe and discharges through the lube oil heat exchanger and into the passages to the diesel engine. The jacket water from the engine returns to the standpipe, completing the cycle.

Once the engine starts, the jacket water keep-warm pump stops, and the jacket water heater shuts off.

The engine-driven jacket water pump is driven by gears on the front of the engine. Pump speed is dependent upon the speed of the diesel engine. This pump takes suction from the jacket water standpipe and discharges to the thermostatic bypass valve. When the water to the thermostatic bypass valve is relatively cool, the valve bypasses the jacket water heat exchanger. As the jacket water temperature in the jacket water heat exchanger changes, the thermostatic bypass valve will modulate to maintain its desired temperature.

The jacket water flows through the tube side of the lube oil heat exchanger and into the diesel engine. Part of the jacket water flow bypasses the heat exchanger and goes to the diesel engine. The jacket water from the diesel engine returns to the standpipe.

The local temperature indications at the heat exchanger are for the jacket water going in and coming out of the heat exchanger. The local temperature indications for the nuclear service cooling water (NSCW) monitor NSCW going in and coming out of the heat exchanger.

C01 - DG1A LOW TEMP JACKET WATER-IN

C02 - DG1A LOW TEMP JACKET WATER-OUT

Acknowledge the alarm.

Investigate the alarm.

Report the temperature indications for the jacket water in and out of the diesel on the Doric trendicator. These alarms may be caused by a malfunction of the jacket water keep-warm pump or possibly a malfunctioning JW keepwarm heater or thermostat. The keep-warm pump should not be operating while the diesel is running. Check that the JW keepwarm heater and pump are operating, and that their MCC breakers are not tripped.

Take corrective action.

Notify the control room operator as temperature drops to 140 degrees F. Assist the operator in starting and running the DG to cycle the temperature between 140 and 170 degrees F. until repairs are made.

Log the activity.

3 - DG1A HI TEMP JACKET WATER-IN (175 degrees F.)

C04 - DG1A HI TEMP JACKET WATER-OUT (190 degrees F.)

As the NSCW flows, it removes heat from the jacket water. The jacket water removes heat from the lube oil at the lube oil heat exchanger. If the NSCW

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or jacket water temperatures are elevated, the lube oil temperatures may also be higher than normal.

Acknowledge the alarm.

Investigate the alarm.

Verify the high temperature conditions exist, and monitor the jacket water cooler inlet, JW IN and JW OUT, temperatures on the engine control panel.

Take corrective action.

The control room operator will trip the diesel generator prior to its JW temperature (in or out) reaching 200 degrees F.

Log the activity.

C03 - DG1A TRIP HI TEMP JACKET WATER

Acknowledge the alarm.

The C03 - DG1A HI TEMP JACKET WATER-IN and C04 - DG1A HI TEMP JACKET WATER-OUT will probably annunciate prior to the diesel trip. The DG1A HI TEMP JACKET WATER-IN and DG1A HI TEMP JACKET WATER-OUT alarms should have been acknowledged before acknowledging the DG1A TRIP HI TEMP JACKET WATER alarm.

Investigate the alarm.

Inspect the items listed in the Probable Cause section of the sub-procedure, and report the local jacket water and NSCW temperature indications at the jacket water heat exchanger.

1. Verify that the diesel generator has tripped and has come to a stop.

NOTE: This diesel engine trip is an "emergency auto stop," and the engine cannot be restarted until after a timer (approximately 90 seconds) has timed out, the jacket water temperature sensors detect less than 200 F, and you have depressed the EMER TRIP reset push button.

2. Verify that the red emergency trip stop light is illuminated on the engine control panel.
3. Report all illuminated annunciators to the control room operator.
4. The control room operator will direct you (using Procedure 17035-1 or 17038-1) in finding the exact cause of the trip. Checks to make include:
  - a. Standpipe level--is it low?
  - b. Engine driven JW pump--check for leaks.
  - c. Three-way mixing valve--if stuck in bypass, NSCW temperatures in and out (JW cooler) will be approximately equal, and JW temperatures



to and from the cooler will both be high.

d. Look for leaks.

5. Report findings to the control room operator.

Take corrective action.

1. Perform any corrective actions as directed by the control room operator.
2. Depress the EMER TRIP reset pushbutton (when directed) and verify that the red emergency stop light extinguishes.
3. The diesel generator can now be restarted, if desired.

Log the activity.

C06 - DG1A LOW PRESS JACKET WATER

C07 - DG1A TRIP LOW PRESS JACKET WATER

C08 - DG1A LOW LEVEL JACKET WATER

The DG LOW PRESS JACKET WATER alarm occurs at 8 psig, decreasing. The DG TRIP LOW PRESS JACKET WATER alarm occurs at 5 psig, decreasing. These alarms would occur if the diesel generator were running, and the following occurred:

1. Malfunction of the engine-driven jacket water pump
2. Leak in the jacket water system
3. Low level in the jacket water standpipe
4. Jacket water pressure switch for the alarm malfunctioned

Acknowledge the alarm.

Investigate the alarm.

The alarms will occur at both the engine control panel and at the control room annunciator panel. Upon receipt of the LOW PRESS JACKET WATER alarm and a directive from the CRO:

1. Check the pressure at the gauge on the engine control panel. It should agree approximately with the alarm setpoint.
2. Check the jacket water pump gauge at the front of the diesel engine. This indicates discharge pressure of the jacket water pump. Do not confuse this gauge with the differential pressure gauge for the jacket water keep-warm pump. If the indicator is reading less than 10 psid, or is fluctuating, inform the control room operator immediately.
3. Check the standpipe level for an indication of loss of level, and check for jacket water leaks. The DG 1A LOW LEVEL JACKET WATER alarm will occur if the level has dropped to its setpoint. A leak leading to a loss of water will result in the jacket water pump losing suction and the alarm occurring. Any leak that causes the alarm to annunciate

should be very visible. If NSCW temperature to and from the JW cooler are at about the same temperature, this can indicate that the JW three-way thermostatic bypass valve has stuck in bypass.

Take corrective action.

Correct any problem with the system. This will primarily involve adding demineralized water to the standpipe.

Log the activity.

Upon receipt of the DG TRIP LOW PRESS JACKET WATER alarm:

Acknowledge the alarm.

Investigate the alarm.

1. If the diesel generator had been started under conditions other than an emergency start, verify that the diesel generator tripped and shutdown. Had the start been an emergency start (indicated by the safety injection actuation signal), or a manual emergency start, the green "safety injection signal" light would have been lit and the red "shutdown system active" light would have been extinguished. On a normal start, the green "safety injection signal" light would have been extinguished and the red "shutdown system active" light would be lit.

NOTE: Had the diesel generator tripped due to low jacket water pressure, and had been started under non-emergency start conditions, it is possible for it to restart immediately with an emergency start, or after 90 seconds with a normal start. If the diesel generator has started by an emergency start (SIAS or manual), the annunciator will come in, and the diesel engine will continue to run.

2. If the diesel generator is still running (had been started by an emergency start):
  - a. Verify that a low pressure condition actually exists by observing the jacket water pressure gauge at the engine control panel.
  - b. Check the discharge pressure of the jacket water pump by observing the jacket water pressure gauge at the front of the diesel generator. After the trip, it should read zero, and the jacket water keepwarm pump will be running.
  - c. Check the standpipe level for an indication of loss of level, and check for jacket water leaks. A significant leak will result in this annunciator coming on when its setpoint is reached. Examine the engine-driven JW pump for evidence of failure.

Take corrective action.

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Coordinate closely with the control room operator. If operational and technical specification conditions warrant, the control room operator may issue a directive to trip the diesel generator per Procedure 13145-1, either by emergency stopping or by shutting down the diesel generator per the procedure.

Log the activity.

Upon receipt of the DG LOW LEVEL JACKET WATER alarm:

Acknowledge the alarm.

Investigate the alarm.

1. Verify that a low level exists. Observe the level gauge on the standpipe (1-LI-19100 for 1A diesel generator) and the wide-range level instrument LI-5741.

Take corrective action.

1. Fill the standpipe to normal level.
2. Instruct an assistant DAD (dispatched by the CRD) to monitor the standpipe level on 1-LI-19100.

NOTE: The indicated level on the narrow range level indicator changes quickly once the valves are opened. The normal level is marked on the level indicator. Ensure that it is not full prior to opening the valves.

3. Report the standpipe level to the control room.
4. Open the 1-2403-U4-753 valve from the Demineralized Water System.
5. Open the jacket water fill and makeup valve.
6. Close the jacket water fill and makeup valve when the assistant DAD indicates that the indicator shows the normal level has been reached.
7. Close the 1-2403-U4-753 valve from the DEMIN Water System.
8. Reset the DG low level jacket water alarm.
9. Investigate the Jacket Water System for leaks, and notify the control room of their location. The CRD may also issue a directive to check drain valves for leaks. Use Plant Vogtle Procedure 11145-1 for a listing of diesel generator valves.
10. Monitor level after filling for indications of a leak, and check piping for leaks.

CAUTION: Jacket water may contain hazardous chemicals.

Log the activity.

PERFORMANCE GUIDE

Follow these steps to investigate a diesel generator alarm associated with the Jacket Water System.

1. Acknowledge the alarm.
2. Investigate the alarm.
3. Take corrective action.
4. Log the activity.



SELF-TEST

Before proceeding to the Task Practice, answer the following questions.

1. What are the two main circuits in the Jacket Water System?
2. When the diesel engine is running, and the DG LOW TEMP JACKET WATER IN annunciator or the DG LOW TEMP JACKET WATER OUT annunciator alarms, the jacket water keep-warm pump will automatically start, and the electric heater will energize.
  - a. True
  - b. False
3. State two diesel generator trips associated with the jacket water system, and give setpoints. Specify which would trip the diesel even if it had been started with an emergency start.

ANSWERS

1. The keep-warm circuit and the engine-driven jacket water pump.
2. False. The jacket water keep-warm pump and heater only operate when the diesel engine is off.
3. DG TRIP HIGH TEMP JACKET WATER. Occurs when 2/3 engine outlet water detectors detect 200 degrees F, and will trip the diesel generator had it been emergency started.  
DG TRIP LOW PRESS JACKET WATER. Occurs at 6 psig jacket water pressure, and will trip the diesel generator only after it had been normally started.

TASK PRACTICE

Before proceeding to the Performance Test, complete the following Task Practice exercise(s).

1. Review Procedures 17038 and 13145. Be sure that you understand all precautions, limitations, and steps associated with responding to a diesel generator Jacket Water System alarm.
2. Take this instructional unit and Procedures 17038 and 13145 to the diesel generator building. Be sure that you can locate all local components and instrumentation associated with responding to a diesel generator Jacket Water System alarm.
3. In the diesel generator building, walk through the task of responding to a diesel generator Jacket Water System alarm. If possible, have a fellow trainee evaluate your performance using Procedures 17038 and 13145 and this instructional unit.

FEEDBACK ON TASK PRACTICE

1. If you have any questions about the precautions, limitations, or steps in Procedures 17038 and 13145, ask your instructor.
2. You should have been able to locate all local components and instrumentation associated with responding to a diesel generator Jacket Water System alarm. If you had any difficulty, ask your instructor for help.
3. You should have walked through the steps necessary to respond to a diesel generator Jacket Water System alarm. If you had any difficulty, re-read the pertinent sections of this instructional unit and the procedure. Resolve any questions with your instructor.