# Draft Submittal

(Pink Paper)

# VOGTLE OP RETAKE EXAM
# 50-424 & 50-425/2003-301

# MAY 8, 2003

1.    Operating Test Simulator Scenarios

Facility: _Vogtle Electric Generating Plant_ Scenario No.: _1_          Op-Test No.: _301-2003_

Examiners: _____ Operators: _____

_____          _____

Initial Conditions:
Rx Power 100%, EOL, Rod Operability Testing in progress with CB C and D left to do.

Turnover:
1A MDAFW out of service

| Event No. | Malf. No. | Event Type* | Event Description |
|---|---|---|---|
| 1 | GE05 | R (RO, SRO) | Abnormal H₂ Pressure - leaking causes crew to rampdown. At approximately 95% power, fix leak. |
| 2 1 |  | N (RO) | Complete Rod Operability Test |
| 3 2 | RD09 _Rod stuck_ | C (RO, SRO) | Control Rod Urgent Failure - On CB D, Gp 2 when pulling bank D. Tech Spec for SRO |
| 4 | Needs development | I (RO) | Failure of 1-PT-0131 high - Causes Letdown High Pressure alarm and fails open 1-PV-0131, Letdown Pressure Control Valve. Causes pressure to go low and a high flowrate. |
| 5 3 | EL10 | C (SRO) | 480VAC Switchgear Fault- Fault switchgear that feeds HV-8801A (BIT valve) Tech Spec for SRO. Begin to slowly ramp in RCS leak at Examiners descretion. |
| 6 4 | TU02 | C (BOP) | Main turbine vibration which leads to the requirement to lower turbine load. Will continue until crew is forced to use rods which, at this point will not drive CB D. This should lead to a manual Rx trip. |
| 7 5 | ES02/1 & RC04 | MT | ATWS followed by Small Break LOCA |
| POST MT |  |  | 1A HHSI pump fails to start, HV-8801B fails to open. |

*  (N)ormal,   (R)eactivity,   (I)nstrument,   (C)omponent,   (M)ajor

ORIGIN                         SETPOINT

1-PT-0131                      425 psig

WINDOW E03

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LTDN HX OUT
HI PRESS
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1.0      PROBABLE CAUSE

1.    1-PV-0131 malfunction.

2.    All three Letdown Orifice Isolation Valves open.

2.0      AUTOMATIC ACTIONS

NONE

3.0      INITIAL OPERATOR ACTIONS

1.    CHECK letdown pressure and flow using 1-PI-0131A and
1-FI-0132 on the QMCB.

2.    GO to 18007-C, "Chemical And Volume Control System
Malfunction" if letdown is lost.

4.0      SUBSEQUENT OPERATOR ACTIONS

NONE

5.0      COMPENSATORY OPERATOR ACTIONS

NONE

END OF SUB-PROCEDURE

REFERENCES:    1X4DB115, PLS

**INSTRUCTOR STATION NO:** RD09

**DESCRIPTION:**    Control Rod Urgent Failure

**CAUSE:**          Bank D, Group 2 power cabinet multiplexing thyristor failure

**SOFTWARE NAME(s):**    Logicals       Severitys

                      YP:XMFTB(84)

**PLANT STATUS:**   100% power

**EFFECTS:**

The control rod urgent failure inhibits automatic control rod motion.

Control banks A, B & C can be positioned in manual individual control. CNTL BK D GP 2 D motion is blocked in manual and auto due to the failure in bank D.

Malfunction removal will restore the control rod system to normal.

**INSTRUCTOR STATION NO: GE05**

**DESCRIPTION:**   Abnormal Generator $H_2$ Pressure

Variable: 100% severity equals a leakrate that will result in a pressure reduction of approximately 10 psig/minute at a generator hydrogen pressure of 75 psig.

**SOFTWARE NAME(s):**   Logicals          Severitys

YP:XMFTB(378)    YPXSVRTY(98)

**CAUSE:**       Hydrogen leakage through a faulty relief valve

**PLANT STATUS:**   100%

**EFFECTS:**

The hydrogen pressure will decrease at a rate designated by the malfunction severity.  The rate of change of pressure will decrease as the hydrogen pressure decreases.

A reduction in hydrogen pressure will reduce the hydrogen Heat transfer coefficient; this will result in an increase in the generator field temperature.  The increase in generator field temperature will in turn increase the hydrogen outlet temperature. This will cause TIC-7097 to open TV-7097 which will increase turbine plant cooling water to the hydrogen coolers.  As the hydrogen pressure continues to decrease, the hydrogen will no longer be capable of removing the Heat generated in the generator field.  If the generator load is not reduced, high generator field.  If the generator load is not reduced, high generator field temperature will result in internal insulation breakdown.  This will be indicated on the generator core monitor.  Continued operation in this condition will result in grounding the generator field and generator neutral ground overcurrent lockout trip.

Upon malfunction removal the relief valve will re-seat stopping the leak and hydrogen pressure reduction.  The hydrogen pressure can be returned to normal by using remote function GE05 which will open the hydrogen supply isolation valve.  The pressurization rate for remote function GE05 will be 0.1 psig/minute at 75 psig hydrogen pressure.  Remote function GE05 may also be used to increase the hydrogen pressure to 100 psig.

4

**INSTRUCTOR STATION NO:** RD09

**DESCRIPTION:**     Control Rod Urgent Failure

**CAUSE:**           Bank D, Group 2 power cabinet multiplexing
                     thyristor failure

**SOFTWARE NAME(s):**     Logicals          Severitys

                         YP:XMFTB(84)

**PLANT STATUS:**   100% power

**EFFECTS:**

The control rod urgent failure inhibits automatic control rod motion.

Control banks A, B & C can be positioned in manual individual control.  CNTL BK D GP 2 D motion is blocked in manual and auto due to the failure in bank D.

Malfunction removal will restore the control rod system to normal.

## 3.1 REACTIVITY CONTROL SYSTEMS

3.1.4 *Rod Group Alignment Limits*

LCO 3.1.4      All shutdown and control rods shall be OPERABLE, with all individual indicated rod positions within 12 steps of their group step counter demand position.

APPLICABILITY:    MODES 1 and 2.

ACTIONS

| CONDITION | REQUIRED ACTION | | COMPLETION TIME |
|---|---|---|---|
| A. One or more rod(s) untrippable. | A.1.1 | Verify SDM is ≥ the limit specified in the COLR. | 1 hour |
| | OR | | |
| | A.1.2 | Initiate boration to restore SDM to within limit. | 1 hour |
| | AND | | |
| | A.2 | Be in MODE 3. | 6 hours |
| B. One rod not within alignment limits. | B.1.1 | Verify SDM is ≥ the limit specified in the COLR. | 1 hour |
| | OR | | |
| | | | (continued) |

ACTIONS

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|---|---|---|
| B. (continued) | B.1.2 Initiate boration to restore SDM to within limit. | 1 hour |
| | AND | |
| | B.2 Reduce THERMAL POWER to ≤ 75% RTP. | 2 hours |
| | AND | |
| | B.3 Verify SDM is ≥ the limit specified in the COLR. | Once per 12 hours |
| | AND | |
| | B.4 Perform SR 3.2.1.1. | 72 hours |
| | AND | |
| | B.5 Perform SR 3.2.2.1. | 72 hours |
| | AND | |
| | B.6 Reevaluate safety analyses and confirm results remain valid for duration of operation under these conditions. | 5 days |

(continued)

ACTIONS  (continued)

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|---|---|---|
| C. Required Action and associated Completion Time of Condition B not met. | C.1 Be in MODE 3 | 6 hours |
| D. More than one rod not within alignment limit. | D.1.1 Verify SDM is ≥ the limit specified in the COLR.<br><br>OR<br><br>D.1.2 Initiate boration to restore required SDM to within limit.<br><br>AND<br><br>D.2 Be in MODE 3. | 1 hour<br><br><br>1 hour<br><br><br><br>6 hours |

SURVEILLANCE REQUIREMENTS

| SURVEILLANCE | FREQUENCY |
|---|---|
| SR 3.1.4.1 Verify individual rod positions within alignment limit. | 12 hours<br><br>AND<br><br>Once within 4 hours and every 4 hours thereafter when the rod position deviation monitor is inoperable |

(continued)

SURVEILLANCE REQUIREMENTS   (continued)

| SURVEILLANCE | FREQUENCY |
|---|---|
| SR  3.1.4.2    Verify rod freedom of movement by moving each rod not fully inserted in the core $\geq$ 10 steps in either direction. | 92 days |
| SR  3.1.4.3    Verify rod drop time of each rod, from the physical fully withdrawn position, is $\leq$ 2.7 seconds from the beginning of decay of stationary gripper coil voltage to dashpot entry, with:<br><br>a.    $T_{avg} \geq 551°F$; and<br><br>b.    All reactor coolant pumps operating. | Prior to reactor criticality after each removal of the reactor head |

Facility: _Vogtle Electric Generating Plant_ Scenario No.:_2_     Op-Test No.: _301-2003_

Examiners: _____ Operators: _____

_____                _____

Initial Conditions: 100 [handwritten]

Rx Power 47% and increasing , EOL, Procedure 12004-C in progress

Rods in auto [handwritten]

Turnover:

1A MDAFW out of service for lube schedule

| Event No. | Malf. No. | Event Type* | Event Description |
|---|---|---|---|
| 1 | | R (RO, BOP) | Ramp up unit by approximately 5% per procedure |
| 2 | CV12 | I (RO) | VCT LT 185 Fails Hi |
| ~~3~~ | ~~FW02C~~ | ~~C (BOP)~~ | ~~1C Main Feed Reg valve oscillates, requiring manual control~~ |
| 4 | CV04 | C (RO) | Loss of cooling to the Letdown Hx, requiring manual control |
| 5 | ~~AE705~~ GE09 [handwritten] | C (BOP) | Load Rejection ~~(May trip Turbine or Rx manually per AOP)~~ with impulse pressure xmtr failing high. [handwritten] |
| 6 | FW06 | MT | Feed break inside containment |
| Post MT | | | Automatic Feedwater isolation fails, HV 8801B thermals out when being closed, 1BMDAFW fails to auto start |
| | | | Scenario ends when primary and secondary plant are stable. |
| | | | |

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

**DESCRIPTION:** Feedwater Line Rupture Inside Containment

Variable: 100% = 9,460,00 lbm/hr (25,000 gpm)

FW06a - FWL1        FW06c - FWL3
FW06c - FWL2        FW06d - FWL4

**SOFTWARE NAME(s):**    Logicals      Severitys

FWL 1:    JMLCFW1(1) SMLCFW1(1)
FWL 2:    JMLCFW1(2) SMLCFW1(2)
FWL 3:    JMLCFW1(3) SMLCFW1(3)
FWL 4:    JMLCFW1(4) SMLCFW1(4)

**CAUSE:**      Pipe break between S/G and temp element TE-15205

**PLANT STATUS:** 100% power

**EFFECTS:**

Use the following chart to insert the malfunction:

| SEVERITY | FLOW TO CTMT FROM SG | FLOW TO CTMT FROM FEED LINE | FEED FLOW TO AFFECTED SG |
|---|---|---|---|
| 100% | 5.76E6 lbm/hr | all FW | 0 lbm/hr |
| 80% | 4.5E6 | all FW | 0 |
| 60% | 3.4E6 | 2.3E6 lbm/hr | 1.6E6 |
| 50% | 2.8E6 | 1.9E6 | 1.9E6 |
| 40% | 0 | 1.5E6 | 2.3E6 |
| 20% | 0 | 7.6E5 | 3E6 |
| 10% | 0 | 3.8E5 | 3.44E6 |
| 0% | 0 | 0 | all FW |

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

At 100% power, the malfunction can be inserted at 21% severity and still maintain the plant on line. This is with the FRV 100% open, three condensate pumps, and the SGFPT's in manual at maximum speed.

Indicated feed flow to the steam generator increases. A feedwater line rupture causes a reduction in feed flow to the

affected steam generator. This reduced feed flow causes the affected steam generator level to decrease. The steam generator level control system responds to maintain level. With maximum severity inserted, the affected steam generator blowsdown rapidly and causes a reactor trip/turbine trip.

The reduced feedwater flow causes a decrease in subcooling of the affected steam generator. This causes an increase in Tavg. Pressurizer level and pressure correspondingly increase. The pressurizer pressure and level control systems respond to this transient.

Once a reactor trip occurs, the affected steam generator and the other steam generators continue to blowdown through the rupture. This leads to a low steamline pressure condition and initiates safety injection steamline and feedwater isolation.

When the SLI & FWI isolations occur, blowdown of the unaffected steam generators stops. The affected loop boils dry due to the location of the rupture. Auxiliary feedwater restores level in the unaffected loops.

Containment pressure and humidity ncrease dependent on break size. The sump levels increase, initiating sump pump starts.

Malfunction removal will stop the leak.

**INSTRUCTOR STATION NO:** CV04

**DESCRIPTION:** Loss of Cooling to Letdown Heat Exchanger

**SOFTWARE NAME(s):** Logicals        Severitys

YP:XMFTB(299)

**CAUSE:** Temperature Element TE 130 Fails Low Causing Temp Control Valve TV-130 to Fully Close

**PLANT STATUS:** 100% power

**EFFECTS:**

V-130 going closed will cause ACCW flow to the letdown Heat exchanger to go to minimum. This will cause an increase in letdown temperature downstream of the letdown Heat exchanger to approximately that at the outlet of the regenerative heat exchanger.

When the letdown temperature exceeds the setpoint for the high temperature exceeds the setpoint for the high temperature diversion valve, it will shift letdown directly to the volume control tank and bypass the demineralizers. Volume control tank temperature will increase and annunciate a high temperature alarm when its setpoint is exceeded.

The operator can take manual control of TV-130 and control letdown temperature.

Malfunction removal will return the failed temperature element to normal.

4

**DESCRIPTION:**    Feed Flow Transmitter Fails (Cont)

Variable: 0-100% of Scale

| | |
|---|---|
| FW02a - FT 510 | FW02c - FT 530 |
| FW02b - FT 520 | FW02d - FT 540 |

**SOFTWARE NAME(s):**    Logicals        Severitys

| | | |
|---|---|---|
| 510 | :YP:XMFTB(443) | YPXSVRTY(106) |
| 520 | :YP:XMFTB(444) | YPXSVRTY(107) |
| 530 | :YP:XMFTB(445) | YPXSVRTY(108) |
| 540 | :YP:XMFTB(446) | YPXSVRTY(109) |

**CAUSE:**        Transmitter failure

**PLANT STATUS:**    100% power (assume failed channel selected for control)

**EFFECTS:**

This feed flow transmitter failing high or low will generate a steam flow-feed flow mismatch condition and alarm.

As transmitter output goes high, the associated feedwater control valve will modulate closed to bring steam and feed flows together. the reduced feedwater flow will cause actual steam generator level to decrease. This level decrease will continue until it either offsets the feed flow error or until a steam generator low low level generates a reactor trip and auxiliary feedwater pumps start. The time required for this to occur will depend on the severity selected.

If this transmitter fails low, just the opposite of the above stated reactions will occur, except that the turbine trip/reactor trip and feedwater isolation will occur if the hi-hi steam generator level is reached.

The operator can take manual feedwater control to stabilize steam generator level at program level or select the other channel for control.

Malfunction removal will cause transmitter output to return to normal.

**INSTRUCTOR STATION NO:** GE09

**DESCRIPTION:**    Load Rejection

                   Variable: Percent Entered will Equal Percent
                             Decrease   in Load Set Setpoint

**SOFTWARE NAME(s):**    Logicals        Severitys

                        YP:XMFTB(382)    YPXSVRTY(102)

**CAUSE:**    Electrical failure in EHC system

**PLANT STATUS:**    100% power, control rods in auto

**EFFECTS:**

This malfunction will decrease the load set setpoint at 133% per minute until the percent decrease is equal to the malfunction severity.  The control valves will close at the maximum rate allowed by the EHC hydraulic system.

The decrease in turbine impulse pressure causes control rods to insert and will arm the steam dumps.  The steam dumps will modulate open or if the Tavg-Tref error is large enough they will quick open.  The system accepts a load reduction of 50% without opening the atmospheric relief valve or a reactor trip.  Larger load reduction may result in a reactor trip, dependent upon the pressurizer pressure and level control system response.

Malfunction removal will stop the decrease in the load set setpoint.

Abnormal Operating Procedures

# TURBINE RUNBACK

PURPOSE                                        **PRB REVIEW** REQUIRED

This procedure provides instructions for validating a turbine **runback,** stabilizing plant conditions following a **runback** and terminating an invalid **runback.**

SYMPTOMS

- **OVERTEMP** DELTA-T ROD STOP TURBINE **RUNBACK** C3 ON BPLB.

- **OVERPWR** DELTA-T ROD STOP **TURBINE RUNBACK** C4 ON **BPLB.**

- OVERPOWER AT ROD BLOCK AND **RUNBACK** ALERT Annunciator

- **OVERTEMP** AT ROD BLOCK AND **RUNBACK** ALERT Annunciator

- **OVERTEMP** DELTA-T ALERT Annunciator.

- OVERPOWER DELTA-T ALERT Annunciator.

- Unexplained loss of generator **MW.**

- Unexplained insertion of control ·rods while in auto.

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| IMMEDIATE OPERATOR ACTIONS | |

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| 1. Verify that a turbine **runback** is - REQUIRED:<br><br>Any 2 out of 4 **runback** bistable status lights energized:<br><br>• OT DELTA-T<br><br>• OP DELTA-T | 1. Go to 8. |
| 2. Ensure Rod Control System 'in AUTO and inserting rods to 'restore **Tavg/Tref.** | 2. Manually insert control rods as required. |
| 3. Verify that a **runback** has initiated:<br><br>• Turbine control **valves-** SHUTTING.<br><br>• Generator load - LOWERING.<br><br>• LOSS OF TURB LOAD INTLK C7 Status Light - E N E R G I Z E D . | 3. Reduce load manually by depressing LOAD DECREASE pushbutton UNTIL:<br><br>• OT DELTA-T or OP DELTA-T **runback** bistable status lights extinguish. |

SUBSEQUENT OPERATOR ACTIONS

| ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|
| 4. Verify Steam Dump System - ARMED AND RESPONDING TO TAVG/TREF DEVIATION. | 4. Verify SG **ARVs** are in AUTO. |
| 5. Verify PRZR Pressure Control System - RESTORING PRESSURE TO 2235 **PSIG.** | 5. Take manual control of PRZR spray and heaters to restore pressure. |
| 6. Verify SGWLC System - RESTORING SG LEVELS TO PROGRAMMED BAND. | 6. Take manual control of **FRVs** and restore level. |

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

7. IF the **runback** condition has cleared, THEN continue operation in accordance with **12004-C,** POWER OPERATION (MODE 1).

7. IF less than 50% power, THEM trip the turbine and go to **18011-C,** TURBINE TRIP BELOW P-9,

-OR-

Trip the reactor and go to **19000-C,** E-O REACTOR TRIP OR SAFETY INJECTION.

NOTE:

> The following steps will place the turbine 'in Standby Mode to facilitate recovery. These steps may be used, if necessary, to stabilize turbine load, and may be used in conjunction with 12004-C, POWER OPERATION (MODE 1).

8. Stabilize turbine loads using STANDBY SIGNAL MATCH controls:

   a. Match CV SIGNAL and IV SIGNAL using STANDBY LOAD SET potentiometer.

   b. Simultaneously depress ON and BYPASS pushbuttons on STANDBY SIGNAL MATCH.

. 9. Check that turbine load stabilizes.

9. IF less than 50% power, THEN **trip** the turbine and go to 18011-C, TURBINE TRIP BELOW P-9.

-OR-

IF **runback** continues, THEN **trip** the reactor and go to **19000-C,** E-O REACTOR TRIP OR SAFETY INJECTION.

ACTION/EXPECTED RESPONSE              RESPONSE NOT OBTAINED

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CAUTION: Turbine loading rates in Standby Mode are not restricted by the EHC System and are totally under control of the operator.

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10. **Control** load using the STANDBY LOAD SET **potentiometer.**

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NOTE: Chemistry should be notified every **time reactor** power is changed by 15% or more in a one-hour period so iodine activity can be determined per Tech **Spec** SR **3.4.16.2.**

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11. IF C-7 present, THEN reset C-7.

12. Perform 14286, TURBINE TRIP DEVICE OPERABILITY TEST, Section 5.1 and 5.2.

13. Continue operation in accordance with the UOP **currently in effect.**

14. IF the load reduction was unplanned or unexplained, THEN initiate a Condition Report per **00150-C,** Condition reporting and Tracking System.

15. WHEN the cause of the **runback** has been corrected, **THEN initiate 13800, TURBINE OPERATION to restore EHC to** normal,

ACTION/EXPECTED RESPONSE      RESPONSE NOT OBTAINED

16. Power ascension may commence after review of event cause and corrective action.


END OF PROCEDURE TEXT