

## LPRM DOWNSCALE

### AUTO ACTIONS

LPRM in inverse video is displayed on the associated APRM ODA header and APRM chassis at P608.

### CAUSE

1. Any one of 124 LPRMs indicating less than or equal to 3 on the 0 to 125 scale.
2. LPRM detector failure.
3. Control rod insertion

### OBSERVATIONS

1. The APRM channel with input from the affected LPRM may indicate slightly lower than other APRM channels.

### ACTIONS

**NOTE:** Periodic LPRM downscale or upscale alarms spuriously illuminating and clearing is an indication of neutronic/thermal-hydraulic instability. LPRMs provide input to OPRM channels for detection and suppression of thermal hydraulic instability events. The OPRM System alarms are a quick method for detection of these instability events.

1. Check the following annunciators to analyze whether the LPRM DOWNSCALE alarm is the result of a thermal-hydraulic instability event:
  - OPRM TRIP ENABLED (A-05 4-8)
  - OPRM PBA/CDA ALARM (A-05 5-8)
  - LPRM UPSCALE (A-06 1-8)
  - OPRM UPSCALE TRIP (A-05 6-8)
2. Identify the affected LPRMs as follows:
  - a. At the APRM NUMAC or ODA, identify the affected APRM by indication of LPRM in inverse video displayed on the header.
  - b. Use PPC Displays 863 (864, 865, 866) LPRM BAR CHART-APRM 1(2,3,4) or PPC Display 861, FILTERED LPRM READINGS EDIT to identify LPRMs indicating below the downscale setpoint.
  - c. If desired, use APRM ODA/NUMAC LPRM BARGRAPHS display to identify downscale LPRMs.

ACTIONS (Continued)

**NOTE:** The core power shape should be symmetrical at each LPRM plane throughout the core.

3. Compare downscale LPRM(s) to other LPRMs as follows:
  - a. Observe the PPC FILTERED LPRM READINGS EDIT display 861 for symmetry.
  - b. Select a control rod adjacent to the affected LPRM string and observe the LPRM BARGRAPH display on RBM ODAs for symmetry.

**NOTE:** Bypassing an LPRM may cause an APRM, OPRM, or RBM channel Inop due to too few LPRM inputs if other LPRMs are already bypassed.

4. If the affected LPRM indication is invalid or erratic, then refer to 20P-09 for bypassing the LPRM.

DEVICE/SETPOINTS

Any of 124 LPRMs	less than or equal to 3 on the 0 to 125 scale
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POSSIBLE PLANT EFFECTS

1. A bypassed or inoperative LPRM detector may result in a Tech Spec LCO.
2. APRM channel inoperable.
3. RBM channel inoperable.
4. OPRM channel inoperable.

REFERENCES

1. LL-09364 - 94
2. Technical Specification B3.3.1.1
3. NEDO-32465-A Licensing Topical Report; Reactor Stability Detect and Suppress Solutions Licensing Basis Methodology for Reload Applicability, GE Nuclear Energy, August 1996
4. 2-FP-05851
5. 20P-09, Neutron Monitoring System Operating Procedure

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## APRM TROUBLE

### AUTO ACTIONS

1. Rod Withdrawal Block if alarm initiated by too few LPRM detectors per level or too few LPRM detectors in flux average.

### CAUSE

1. The quantity of operating LPRM detectors at any given reactor level is less than three.
2. The quantity of operating LPRM detectors in the flux average is less than 17.
3. Any self-test fault.

### OBSERVATIONS

1. ROD OUT BLOCK (A-05 2-2) alarm.
2. The Rod Withdrawal Permissive indicating light will be off.
3. On APRM BARGRAPH display at P608 and PPC Displays 882-885, LPRMs in average is less than 17, if this condition caused the alarm.

### ACTIONS

**NOTE:** If cause of the alarm is due to too few LPRMs in the average or too few LPRMs per axial level, the APRM is inoperable in accordance with Tech Spec Basis 3.3.1.1. However, no trip is automatically sent to the Voters.

1. If necessary to determine which APRM initiated the alarm, perform the following at each APRM ODA:
  - a. Press ETC soft key to obtain TRIP STATUS soft key.
  - b. Press TRIP STATUS soft key.
  - c. Observe an asterisk in inverse video in the Trouble Alarm column, indicating this APRM initiated the alarm.
  - d. Press INOP STATUS soft key to determine cause of the alarm.
2. Refer to Tech Spec Section 3.3.1.1 for required actions.
3. If the APRM cannot be returned to operable status, then if possible, place the affected APRM in Bypass.
4. When plant conditions allow, return LPRMs to service and remove the affected APRM from Bypass.
5. If self-test fault initiated the alarm, then contact I&C.

ACTIONS

APRM Channels 1 through 4

Less than 17 LPRM detector  
inputs to flux average

Less than 3 LPRM detectors per  
axial level.

Self-test fault.

POSSIBLE PLANT EFFECTS

1. APRM inoperable.
2. If an APRM channel is inoperable or bypassed, a Tech Spec LCO or TRM Compensatory Measure may result.

REFERENCES

1. LL-09364 - 94
2. 2-FP-05851
3. Tech Spec 3.3.1.1, B3.3.1.1, TRMS 3.3
4. APP A-05 2-2, ROD OUT BLOCK

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ROD OUT BLOCK

AUTO ACTIONS

1. Rod withdrawal prohibited.

CAUSE

1. South SDV not drained.
2. North SDV not drained.
3. SRM downscale and any IRM is below Range 3.
4. IRM downscale and affected IRM channel is not on Range 1.
5. SRM upscale/inoperative and any IRM channel is below Range 8.
6. IRM upscale and the reactor system mode switch is not in the RUN position.
7. IRM A upscale/inoperative and the reactor system mode switch is not in the RUN position.
8. SRM detector not fully inserted and log count rate is less than or equal to 100 cps (bypassed when all IRM channels are above Range 2 or the reactor system mode switch is in the RUN position).
9. IRM B upscale/inoperative and the reactor system mode switch is not in the RUN position.
10. APRM downscale and the reactor system mode switch is in the RUN position.
11. APRM UPSCALE alarm.
12. APRM UPSCALE TRIP/INOP alarm.
13. Less than 17 LPRM inputs to any APRM or less than 3 LPRMs per axial level for any APRM.
14. RBM downscale and reactor system mode switch is in the RUN position.
15. RBM upscale/inoperative.
16. Recirc flow signal to any APRM greater than or equal to 110%.
17. Discharge Volume Hi Water Level Trip Bypass switch in Bypass with the Reactor System Mode Switch in Shutdown or Refuel.
18. Reactor System Mode Switch in Refuel with a second rod selected and another rod not full in.

**NOTE:** The Service Platform has been removed. Associated refuel interlocks are non-functional, but available.

19. Reactor System Mode Switch in Startup AND the refuel bridge is over the core OR the service platform is loaded.
20. Reactor System Mode Switch in Refuel with the service platform loaded.
21. Reactor System Mode Switch in Refuel with the refuel bridge over the core AND the grapple loaded OR not full up.
22. Reactor System Mode Switch in Refuel with the refuel bridge over the core AND any refuel bridge hoist loaded.
23. No power to the refuel bridge.
24. Reactor System Mode Switch in Shutdown.
25. Any IRM detector not fully inserted and the reactor mode switch is not in RUN.
26. Circuit malfunction.

#### OBSERVATIONS

1. Selected rod will not withdraw.
2. Rod withdraw permissive light is off.
3. SOUTH SDV NOT DRND (A-05 1-1) alarm.
4. NORTH SDV NOT DRND (A-05 2-5) alarm.
5. SRM DOWNSCALE (A-05 1-3) alarm.
6. IRM DOWNSCALE (A-05 1-4) alarm.
7. SRM UPSCALE/INOP (A-05 2-3) alarm.
8. IRM UPSCALE (A-05 2-4) alarm.
9. IRM A UPSCALE/INOP (A-05 3-4) alarm.
10. SRM DET RETRACT NOT PERMITTED (A-05 4-3) alarm.
11. IRM B UPSCALE/INOP (A-05 4-4) alarm.
12. APRM DOWNSCALE (A-06 2-7) alarm.
13. APRM UPSCALE (A-06 2-8) alarm.
14. APRM TROUBLE (A-06 3-7) alarm.
15. APRM UPSCALE TRIP/INOP (A-06 3-8) alarm.
16. RBM DOWNSCALE/TROUBLE (A-06 4-7) alarm.
17. RBM UPSC/INOP (A-06 4-8) alarm.
18. FLOW REF OFF NORMAL (A-06 5-7) alarm.

#### ACTIONS

1. Refer to appropriate Annunciator procedure listed in OBSERVATIONS.
2. Verify proper position of the Discharge Volume Hi Water Level Trip Bypass switch, refer to APP A-05 1-5.
3. Verify proper positioning of the refueling equipment and power supplies.

#### DEVICE/SETPOINTS

Rod Out Block Relays C12A-K1 or C12A-K2

Deenergized

#### POSSIBLE PLANT EFFECTS

1. Control rods may not be withdrawn from the core while the rod block is in effect.

#### REFERENCES

1. LL-9364 - 74
2. FP-50012 - 6