

REACTIVITY CONTROL SYSTEMS

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

GROUP HEIGHT

LIMITING CONDITION FOR OPERATION

3.1.3.1 All full length (shutdown and control) rods which are inserted in the core shall be OPERABLE and positioned within ± 12 steps (determined in accordance with Specification 3.1.3.2 of their group step counter demand position).

APPLICABILITY: MODES 1* and 2*

ACTION:

- a. With one or more full length rods inoperable due to being immovable as a result of excessive friction or mechanical interference or known to be untrippable, determine that the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is satisfied within 1 hour and be in HOT STANDBY within 6 hours.
- b. With more than one full length rod INOPERABLE or indicated to be misaligned from any other rod in its group by more than ± 12 steps (determined in accordance with Specification 3.1.3.2), be in HOT STANDBY within 6 hours.
- c. With one full length rod inoperable or indicated to be misaligned from its group step counter demand height by more than ± 12 steps (determined in accordance with Specification 3.1.3.2), POWER OPERATION may continue provided that within one hour either:
 1. The rod is restored to OPERABLE status within the above alignment requirements, or
 2. The rod is declared inoperable and the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is satisfied. POWER OPERATION may then continue provided that:
 - a) An analysis of the potential ejected rod worth is performed within 3 days and the rod worth is determined to be $\leq 0.95\% \Delta k$ at zero power and $\leq 0.20\% \Delta k$ at RATED THERMAL POWER for the remainder of the fuel cycle, and
 - b) The SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is determined at least once per 12 hours, and

* See Special Test Exceptions 3.10.2 and 3.10.4

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POSITION INDICATOR CHANNELS

LIMITING CONDITION FOR OPERATION

3.1.3.2 For Cycle 2 operation, all shutdown and control rod position indicator channels and the demand position indication system shall be OPERABLE and capable of determining the control rod positions within ± 12 steps by direct analog indication or as a backup by measurement of channel detector primary voltages. If a rod position indicator analog channel indicates 12 steps or more deviation from the group demand indicator, rod positions for the affected rods shall be determined by measuring detector primary voltages, as follows:

- a. immediately,
- b. if associated rods move greater than 6 steps (greater than 12 steps if all rods in the group have been determined to be within 6 steps of the group demand indicator by primary voltage measurements within the previous 4 hours),
- c. at 4 hour intervals if the affected rod(s) are not fully inserted or fully withdrawn,
- d. at 24 hour intervals if the affected rod(s) are fully inserted or fully withdrawn.

When the rod position indicator channel is INOPERABLE, the position of not more than three control rods per bank which are not fully inserted or fully withdrawn may be determined by use of the detector primary voltage measurements.*

APPLICABILITY: Modes 1 and 2*

ACTION:

- a. If greater than 3 rod position indicators per bank, for banks not fully withdrawn or fully inserted, are INOPERABLE, then declare the rod position indicator system to be INOPERABLE and be in HOT STANDBY within 1 hour after the allowed 1 hour stabilization period and in COLD SHUTDOWN in the following 30 hours. Submit a Special Report to the NRC by telephone and in writing within 24 hours or by the close of the next business day, whichever is later. Restore all affected Rod Position Indicators to OPERABLE status prior to entry to Mode 2.
- b. If the position of a maximum of one rod cannot be determined by either the direct reading of the rod position indicators or by reading primary detector voltage measurements, either:
 1. Determine the position of the non-indicating rod indirectly by the movable incore detectors immediately and at least once per 8 hours and immediately after any motion of the non-indicating rod which exceeds 24 steps in one direction since the last determination of the rod's position, or
 2. Reduce THERMAL POWER TO $< 50\%$ of RATED THERMAL POWER within 8 hours.

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ACTION: (Continued)

- c. With a maximum of one demand position indicator per bank inoperable, either:
 - 1. Verify that all rod position indicators for the affected bank are OPERABLE and that the most withdrawn rod and the least withdrawn rod of the bank are within a maximum of 12 steps of each other immediately after rod motion greater than 6 steps (greater than 12 steps if all rods in the group have been determined to be within 6 steps of the group demand indicator by voltage measurements within the previous 4 hours) and at least once per 8 hours, or
 - 2. Reduce THERMAL POWER TO < 50% of RATED THERMAL POWER within 8 hours.
- d. If the position of more than one rod cannot be determined by either the direct reading of the rod position indicators or by reading primary detector voltage measurements, then Specification 3.0.3 is applicable.

SURVEILLANCE REQUIREMENTS

4.1.3.2 Each rod position indicator channel shall be determined to be OPERABLE by verifying the demand position indication system and the rod position indicator channels agree within 12 steps at least once per 12 hours (except during time intervals when the Rod Position Deviation Monitor is INOPERABLE or is in a continuous state of alarm), then compare the demand position indication system and the rod position indicator channels at approximately 4 hour intervals, as follows:

- a. If an individual rod position indicator analog channel does not settle to within ± 12 steps within 1 hour, then declare that channel INOPERABLE.
- b. For any INOPERABLE channel, no repairs or adjustments shall be permitted without being followed immediately by a full range calibration.

* For Core PHYSICS TESTING in Mode 2, primary detector voltage measurements may be used to determine the position of rods in shutdown banks A and B and control banks A and B for the purpose of satisfying Specification 3.1.3.2. During Mode 2 operations, rod position indicators for shutdown banks A and B and control banks A and B may deviate from the group demand indicators by greater than ± 12 steps during reactor startup and shutdown operations, while rods are being withdrawn or inserted. If the rod position indicators for shutdown banks A and B and control banks A and B deviate by greater than ± 12 steps from the group demand indicator, rod withdrawal or insertion may continue until the desired group height is achieved.

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BASES

3/4.1.3 MOVABLE CONTROL ASSEMBLIES (Continued)

The maximum rod drop time restriction is consistent with the assumed rod drop time used in the accident analyses. Measurement with $T_{avg} \geq 541^{\circ}\text{F}$ and with all reactor coolant pumps operating ensures that the measured drop times will be representative of insertion times experienced during a reactor trip at operating conditions.

Control rod positions and OPERABILITY of the rod position indicators are required to be verified on a nominal basis of once per 12 hours with more frequent verifications required if an automatic monitoring channel is inoperable. These verification frequencies are adequate for assuring that the applicable LCO's are satisfied.

Flexibility in the methods of determination of rod position by using primary voltage measurement is provided in this specification to allow for known drifts which are characteristic of the rod position indication system. Use of detector primary voltage measurements for rod position determination for up to 3 rods is allowed for extended periods provided that increased surveillance is maintained. This flexibility does not alter the basic accuracy assumptions of the rod position indication system.