3.1 REACTIVITY CONTROL SYSTEMS

3.1.1 SHUTDOWN MARGIN (SDM)

LCO 3.1.1 SDM shall be within the limits specified in the COLR.

APPLICABILITY: MODES 3, 4, and 5.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. SDM not within limits.	A.1 Initiate boration to restore SDM to within limits.	15 minutes

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.1.1	Verify SDM to be within the limits specified in the COLR.	24 hours

3.1 REACTIVITY CONTROL SYSTEMS

3.1.2 Core Reactivity

LCO 3.1.2 The measured core reactivity shall be within ± 1000 pcm of predicted values.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Measured core reactivity not within limit.	A.1 Re-evaluate core design and safety analysis, and determine that the reactor core is acceptable for continued operation. AND A.2 Establish appropriate operating restrictions and SRs.	7 days 7 days
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.2.1	----------NOTE---------- The predicted reactivity values must be adjusted (normalized) to correspond to the measured core reactivity prior to exceeding a fuel burnup of 60 effective full power days (EFPD) after each fuel loading. ----------	
	Verify measured core reactivity is within ± 1000 pcm of predicted values.	Once prior to entering MODE 1 after each refueling AND --------NOTE-------- Only required after 60 EFPD ---------- 31 EFPD thereafter

3.1 REACTIVITY CONTROL SYSTEMS

3.1.3 Moderator Temperature Coefficient (MTC)

LCO 3.1.3 The MTC shall be maintained within the limits specified in the COLR and a maximum upper limit as specified below:

a. 5 pcm/°F when THERMAL POWER < 50% RTP; and

b. 0 pcm/°F when THERMAL POWER is ≥ 50% RTP.

APPLICABILITY: MODE 1 and MODE 2 with k_{eff} ≥ 1.0 for the upper MTC limit, MODES 1, 2, and 3 for the lower MTC limit.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. MTC not within upper limit.	A.1 Establish administrative withdrawal limits for control banks to maintain MTC within limit.	24 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 Be in MODE 2 with keff < 1.0.	6 hours
C. MTC not within lower limit.	C.1 Be in MODE 4.	12 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.1.3.1	Verify MTC is within upper limit.	Once prior to entering MODE 1 after each refueling
SR 3.1.3.2	----------NOTE---------- If the MTC is more negative than the COLR limit when extrapolated to the end of cycle, SR 3.1.3.2 must be repeated prior to exceeding the minimum allowable boron concentration at which MTC is projected to exceed the lower limit. ---------- Verify the MTC is within the lower limit specified in the COLR.	Once each fuel cycle within 7 EFPD of reaching 2/3 of expected core burnup

3.1 REACTIVITY CONTROL SYSTEMS

3.1.4 Rod Control Cluster Assembly (RCCA) Group Alignment Limits

LCO 3.1.4 All shutdown and control RCCAs shall be OPERABLE.

AND

Individual indicated analog RCCA positions shall be within 8 steps of their group digital RCCA position indication.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more RCCAs inoperable.	A.1.1 Verify SDM to be within the limits specified in the COLR. OR A.1.2 Initiate boration to restore SDM to within limit. AND A.2 Be in MODE 3.	1 hour 1 hour 6 hours
B. One RCCA not within alignment limits.	B.1.1 Verify SDM to be within the limits specified in the COLR. OR B.1.2 Initiate boration to restore SDM to within limit. AND	1 hour 1 hour

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
	B.2 Reduce THERMAL POWER to ≤ 50% RTP. AND	2 hours
	B.3 Verify SDM is within the limits specified in the COLR. AND	Once per 12 hours
	B.4 Perform a flux map, using the Aeroball Measurement System, and calibrate the self powered neutron detectors. AND	12 hours
	B.5 Re-evaluate safety analyses and confirm results remain valid for duration of operation under these conditions.	5 days
C. Required Action and associated Completion Time of Condition B not met.	C.1 Be in MODE 3.	6 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Two or more RCCAs not within alignment limits.	D.1.1 Verify SDM to be within the limits specified in the COLR. OR D.1.2 Initiate boration to restore SDM to within limit. AND D.2 Be in MODE 3.	1 hour 1 hour 6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.4.1	Verify individual RCCA positions within alignment limit.	12 hours
SR 3.1.4.2	Verify RCCA freedom of movement (trippability) by moving each RCCA not fully inserted in the core ≥ 16 steps in either direction.	92 days
SR 3.1.4.3	Verify drop time of each RCCA, from the fully withdrawn position, is ≤ 3.5 seconds from opening of the reactor trip breaker to the centerline of lowest RCCA position indication coil, with: a. Tavg ≥ 500°F; and b. All reactor coolant pumps operating.	Prior to criticality after each removal of the reactor head

3.1 REACTIVITY CONTROL SYSTEMS

3.1.5 Shutdown Bank Insertion Limits

LCO 3.1.5 Each shutdown bank shall be within insertion limits specified in the COLR.

APPLICABILITY: MODES 1 and 2.

----------NOTE----------
This LCO is not applicable while performing SR 3.1.4.2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more shutdown banks not within limits.	A.1.1 Verify SDM is within the limits specified in the COLR. OR A.1.2 Initiate boration to restore SDM to within limit. AND A.2 Restore shutdown bank(s) to within limits.	1 hour 1 hour 2 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.5.1	Verify each shutdown bank is within the insertion limits specified in the COLR.	12 hours

3.1 REACTIVITY CONTROL SYSTEMS

3.1.6 Control Bank Insertion Limits

LCO 3.1.6 Each rod control cluster assembly (RCCA) control bank shall be within insertion, sequence, and overlap limits specified in the COLR.

APPLICABILITY: MODES 1 and 2.

----------NOTE----------
This LCO is not applicable while performing SR 3.1.4.2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more RCCA control banks with insertion limits not met.	A.1.1 Verify SDM is within the limits specified in the COLR. OR A.1.2 Initiate boration to restore SDM to within limit. AND A.2 Restore RCCA control bank(s) to within insertion limits.	1 hour 1 hour 2 hours
B. One or more RCCA control banks with sequence or overlap limits not met.	B.1.1 Verify SDM is within the limits specified in the COLR. OR B.1.2 Initiate boration to restore SDM to within limit. AND	1 hour 1 hour

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
	B.2 Restore RCCA control bank(s) to within sequence and overlap limits.	2 hours
C. Required Action and associated Completion Time not met.	C.1 Be in MODE 3.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.6.1	Verify estimated critical RCCA control bank position is within the limits specified in the COLR.	Once within 4 hours prior to achieving criticality
SR 3.1.6.2	Verify each RCCA control bank position is within the insertion, sequence, and overlap limits specified in the COLR.	12 hours

3.1 REACTIVITY CONTROL SYSTEMS

3.1.7 Rod Control Cluster Assembly (RCCA) Position Indication.

LCO 3.1.7 The Analog and Digital RCCA Position Indication shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each analog RCCA position indicator and each digital RCCA position indicator.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more banks with one individual analog RCCA position indicator inoperable.	A.1.1 Implement the imbalance/dropped RCCA penalty on the Low DNBR reactor trip setpoint. AND A.1.2 Verify position of RCCAs with inoperable position detectors indirectly using the SPNDs. OR	8 hours Once per 8 hours AND Once within 4 hours after an RCCA with an inoperable analog RCCA position indicator has been moved in excess of 20 steps in one direction since the last determination of the RCCA's position

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
	A.2	Reduce THERMAL POWER to ≤ 50% RTP.	8 hours
B. One or more banks with two or more analog RCCA position indicators inoperable.	B.1	Verify three rod control cluster assembly units (RCCAUs) are OPERABLE.	Immediately
	AND		
	B.2	Place the RCCAs under manual control.	Immediately
	AND		
	B.3	Determine the Reactor Coolant System T_{avg}.	Once per 1 hour
	AND		
	B.4	Restore inoperable analog RCCA position indicator(s) to OPERABLE status such that a maximum of one analog RCCA position indicator in the associated bank is inoperable.	24 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. One or more banks with one digital RCCA position indicator inoperable.	C.1.1 Verify by administrative means all analog RCCA position indicators for the affected bank are OPERABLE. AND	Once per 8 hours
	C.1.2 Verify the most withdrawn RCCA and the least withdrawn RCCA of the affected bank are within the RCCA alignment limits. OR	Once per 8 hours
	C.2 Reduce THERMAL POWER to ≤ 50% RTP.	8 hours
D. Required Action and associated Completion Time of Condition not met.	D.1 Be in MODE 3.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.7.1	Verify each analog RCCA position indication agrees within 8 steps of the digital RCCA position indication over a span from 10 steps to the full out position that is defined in COLR.	Once prior to criticality after each removal of the reactor head

3.1 REACTIVITY CONTROL SYSTEMS

3.1.8 Boron Dilution Protection (BDP)

LCO 3.1.8 The volume control tank (VCT) and letdown isolation valves shall be OPERABLE.

APPLICABILITY: MODES 3, 4, 5, and 6.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more VCT or letdown isolation valves inoperable.	A.1 Isolate the affected boron dilution flow path by use of at least one closed and de-activated automatic valve or closed manual valve. AND	8 hours
	A.2 ----------NOTE---------- Isolation devices that are locked, sealed, or otherwise secured may be verified by use of administrative means. ---------- Verify the affected boron dilution flow path is isolated.	31 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.8.1	Verify the isolation time of each VCT and letdown isolation valve is within limits.	In accordance with the Inservice Testing Program
SR 3.1.8.2	Verify each VCT and letdown isolation valve actuates to the isolation position on an actual or simulated signal.	24 months

3.1 REACTIVITY CONTROL SYSTEMS

3.1.9 PHYSICS TESTS Exceptions – MODE 2

LCO 3.1.9 During the performance of PHYSICS TESTS, the requirements of

LCO 3.1.3, "Moderator Temperature Coefficient,"
LCO 3.1.4, "RCCA Group Alignment Limits,"
LCO 3.1.5, "Shutdown Bank Insertion Limits," and
LCO 3.1.6, "Control Bank Insertion Limits,"

may be suspended provided:

a. SDM is within the limits specified in the COLR and;

b. THERMAL POWER is $\leq$ 5% RTP.

APPLICABILITY: During PHYSICS TESTS initiated in MODE 2.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. SDM not within limit.	A.1	Initiate boration to restore SDM to within limit.	15 minutes
	AND		
	A.2	Suspend PHYSICS TESTS exceptions.	1 hour
B. THERMAL POWER not within limit.	B.1	Open reactor trip breakers.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.9.1	Verify THERMAL POWER is ≤ 5% RTP.	30 minutes
SR 3.1.9.2	Verify SDM is within the limits specified in the COLR.	24 hours