Calvert Cliffs
CEA Recovery Time
License Amendment Request

NRC Pre-application meeting
(Non-Proprietary)

April 21, 2026

Agenda

- Introductions
- Meeting Objectives
- Purpose / Background Information
- Proposed Changes
- Timeline

Meeting Objectives

- Present information to NRC to enable a clear understanding of the overall project and proposed unit- and cycle-specific License Amendment Request (LAR) submittal
  - Calvert Cliffs permanent extension of Technical Specification (TS) 3.1.4 misaligned control element assembly (CEA) recovery time
- Obtain feedback from the NRC on the proposed LAR to ensure high quality submittal and minimize the need for Requests for Additional Information (RAIs)
- Mutual understanding of the proposed schedule and corresponding need date in order to ensure adequate NRC resource availability

Purpose / Background Information

- CCNPP has observed a trend with the current configuration where a single point vulnerability caused a Control Element Assembly (CEA) to become misaligned in the core at full power
  - CCNPP has replaced the current CEA drive system on both Units
    - Unit 2 – 2025
    - Unit 1 – 2026
- Current TS require restoration of a misaligned (>7.5 inches) CEA within 2-4 hours
  - Framatome analyses have been completed demonstrating that at least 7 days is available to recover a misaligned CEA using the approved methodologies listed in TS 5.6.5.b
- CCNPP plans to update the current core monitoring system (CMS)
  - Framatome's POWERTRAX system will be replaced with Studsvik's Gardel system
  - Updated CMS provides more accurate modeling of core power distribution including axial and radial asymmetries due to misaligned CEAs
  - No License Amendment Request (LAR) is anticipated to be necessary for the CMS update
  - Studsvik Topical Report SSP-14-P01/028-TR (ML17279A986) is NOT an input in the Framatome analysis

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Purpose / Background Information (cont.)

- Calvert Cliffs Nuclear Power Plant (CCNPP) Reactor Protection System (RPS) Technical Specification (TS) 3.1.4 requires:
  - All CEAs shall be OPERABLE and aligned to within 7.5 inches (indicated position) of their respective group, and the Control Element Assembly (CEA) motion inhibit and the CEA deviation circuit shall be OPERABLE.
- Under the current TS 3.1.4, if a CEA is misaligned in Modes 1 and 2:
  - One or more by > 7.5 inches and ≤ 15 inches -> restore CEA alignment within 1 hour (TS 3.1.4 A)
  - One (only) misaligned > 15 inches -> restore CEA alignment in accordance with the COLR (0 to 2 hours based on FrT) (TS 3.1.4 B)
- If alignment is not restored within the required time, then Reduce THERMAL POWER to < 70% Rated Thermal Power (RTP) within 1 hour AND Restore CEA alignment within 2 hours (TS 3.1.4 C)

3.1 REACTIVITY CONTROL SYSTEMS

3.1.4 Control Element Assembly (CEA) Alignment

LCO 3.1.4 All CEAs shall be OPERABLE and aligned to within 7.5 inches (indicated position) of their respective group, and the CEA motion inhibit and the CEA deviation circuit shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more CEAs trippable and misaligned from its group by > 7.5 inches and ≤ 15 inches.	A.1 Restore CEA alignment.	1 hour
B. One CEA trippable and misaligned from its group by > 15 inches.	B.1 Restore CEA alignment.	In accordance with the COLR
C. Required Action and associated Completion Time of Condition A or B not met.	C.1 Reduce THERMAL POWER to ≤ 70% RTP. AND C.2 Restore CEA alignment.	1 hour 2 hours

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Purpose / Background Information (cont.)

- TS Bases (TSB) 3.1.4:
  - Xenon redistribution in the core starts to occur as soon as a CEA becomes misaligned
  - Restoring CEA alignment ensures acceptable power distributions are maintained
  - Small CEA misalignments (≤15 inches)
    - Small effect on the time-dependent, long-term power distributions relative to those used in generating LCOs and limiting safety system settings setpoints
    - Negligible effect on the available SDM
    - Small effect on the ejected CEA worth used in the accident analysis
  - Large CEA misalignment (>15 inches)
    - Larger distortion of the core power distribution which may have significant effect on the time-dependent, long-term power distributions relative to those used in generating LCOs and limiting safety system settings setpoints
  - Reducing thermal power ensures acceptable core power distributions are maintained during the additional time provided to restore alignment

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Purpose / Background Information (cont.)

- Updated Final Safety Analysis Report (UFSAR):
  - Section 3.4.4: Allowable CEA misalignment within any CEA group is specified in TS and intentional misalignment of CEAs within a group for the purpose of power shaping is not allowed
  - Section 7.4.2.2: The CEA misalignment, group sequencing, group overlap, and total insertion that can occur at the alarm and motion inhibit limits discussed above are factored into the thermal margin and axial flux offset trips. Furthermore, no single failure of the Control Element Drive System (CEDS), other than a CEA drop incident, will cause any of these CEA limits to be violated
  - Section 14.11.2: After detection of CEA drop/misalignment, the operator will initiate a power reduction as required by TS

Purpose / Background Information (cont.)

- Precedent
  - After lowering power to ≤ 75% RTP, Westinghouse standard TS (NUREG-1431 Revision 5) allow up to 5 days to complete re-evaluation of safety analyses
  - Pending verification of safety analysis re-evaluation within 5 days, operation can continue in this condition indefinitely
  - Proposed change is first-of-a-kind change for Combustion Engineering (CE) plants

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
	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 within the limits specified in the COLR.	Once per 12 hours
	AND		
	B.4	Perform SR 3.2.1.1, SR 3.2.1.2, and SR 3.2.2.1.	72 hours
	AND		
	B.5	Re-evaluate safety analyses and confirm results remain valid for duration of operation under these conditions.	5 days

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Proposed Changes

- Framatome analyses have been completed demonstrating that at least 7 days is available to recover a misaligned (dropped) CEA using the approved methodologies listed in TS 5.6.5.b
- Dropped CEA bounds small (7.5 – 15 inch) single CEA misalignments
  - Minimum 1 hour maintained consistent with current TS
  - Additional time allowed in some circumstances per COLR as currently allowed for > 15 misalignments
- With single CEA misalignment not restored within required time
  - Reduce power to 60% RTP
  - Confirm thermal limits are met within 1 hour and every 8 hours thereafter
  - Restore CEA alignment within 7 days
  - If CEA alignment cannot be restored within 7 days, proceed to MODE 3 shutdown

LCO 3.1.4 All CEAs shall be OPERABLE and aligned to within 7.5 inches (indicated position) of their respective group, and the CEA motion inhibit and the CEA deviation circuit shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

	CONDITION		REQUIRED ACTION	COMPLETION TIME
A.	One ~~or more~~ CEAs trippable and misaligned from its group by > 7.5 inches and ≤ 15 inches.	A.1	Restore CEA alignment.	1 hour OR In accordance with the COLR
C. B.	One CEA trippable and misaligned from its group by > 15 inches.	C. B.1	Restore CEA alignment.	In accordance with the COLR
D. C.	Required Action and associated Completion Time of Condition A ~~or~~ B not met.	D. C.1	Reduce THERMAL POWER to ≤ 70% RTP.	1 hour
		AND		
		D. C.2	Restore CEA alignment.	2 hours
E. Required Action and associated Completion Time of Condition A or C not met.		E.1 Reduce THERMAL POWER to ≤ 60% RTP. AND E.2 Perform SRs 3.2.3.1, 3.2.4.1, and 3.2.5.1. AND E.3 Restore CEA alignment.		1 hour Once within 1 hour after reaching 60% RTP AND Once per 8 hours thereafter 7 days

B. More than one CEA trippable and misaligned from its group by > 7.5 inches and ≤ 15 inches.

B.1 Restore CEA alignment.

1 hour

Proposed Changes (cont.)

- No changes proposed to TS 3.1.5, Shutdown CEA Insertion Limits
  - 2-hour restoration time for misaligned/dropped shutdown CEA still applies
- No changes proposed to TS 3.1.6, Regulating CEA Insertion Limits
  - Limits are based on regulating CEA group position

Shutdown CEA Insertion Limits
3.1.5

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One shutdown CEA withdrawn ≥ 121.5 inches and < 129 inches for > 7 days per occurrence or > 14 days per 365 days. OR One shutdown CEA withdrawn < 121.5 inches. OR Two or more shutdown CEAs not within limit.	B.1 Restore shutdown CEA(s) to within limit.	2 hours
C. Required Action and associated Completion Time not met.	C.1 Be in MODE 3.	6 hours

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Timeline

- Constellation submittal of LAR – 5/15/2026
- Requested NRC LAR approval – 3/16/2027
  - Expected comprehensive review per NRC graded approach (ML25216A238)
- LAR implementation
  - Gardel CMS cutover expected in 2027
  - If approved, proposed change would be implemented with 120 days of Gardel cutover completion for both units and prior to MODE 5 entry to start the CC1R29 refueling outage (Spring 2028)

End of Public Portion