UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 29, 2025

LICENSEE: Tennessee Valley Authority

FACILITY: Browns Ferry Nuclear Plant, Units 1, 2, and 3

SUBJECT: SUMMARY OF JULY 14, 2025, PUBLIC TELECONFERENCE WITH TENNESSEE VALLEY AUTHORITY TO DISCUSS A PROPOSED LICENSE AMENDMENT REQUEST REGARDING REVISION TO TS 3.3.2.1 FOR ROD WORTH MINIMIZER (EPID L-2025-LRM-0088)

On July 14, 2025, the U.S. Nuclear Regulatory Commission (NRC) staff held a public meeting via teleconference with representatives of the Tennessee Valley Authority (TVA) to discuss a proposed license amendment request (LAR) for Browns Ferry Nuclear Plant (Browns Ferry), Units 1, 2, and 3. The meeting notice and agenda for this meeting, dated June 2, 2025, are available at Agencywide Documents Access and Management System (ADAMS) Accession No. ML25182A016. The licensee's slides for the meeting are available at ADAMS Accession No. ML25189A074. A list of the meeting attendees is enclosed.

TVA stated that it plans to submit an LAR for Browns Ferry, Units 1, 2, and 3, that would revise Technical Specification (TS) 3.3.2.1, "Control Rod Block Instrumentation," to allow an unrestricted number of reactor startups with the rod worth minimizer (RWM) inoperable. Specifically, current TS Required Action C.2.1.2, which verifies that reactor startup with RWM inoperable has not been performed in the last calendar year, would be replaced with a new Required Action C.2.1.2 to verify control rod coupling checks are performed for the first 12 rods. Required Action C.2.2 to verify that control rod movement is in compliance with banked position withdrawal sequence (BPWS) by a second licensed operator or other qualified member of the technical staff is maintained.

TVA explained that the RWM is a subsystem of the plant process computer and functions as a backup to the operator during movement of control rods during reactor startup, shutdown, and low power level (less than 10 percent rated thermal power) control rod sequences. The use of RWM minimizes the consequences of a design basis control rod drop accident (CRDA) by enforcing pre-established control rod sequences in accordance with the BPWS. The sequences are designed to maintain individual control rod worths such that the peak fuel enthalpy would remain below the specific energy design limit of 280 calories per gram (cal/g) in the event of a CRDA. This ensures that the offsite dose consequences of a CRDA will be within the guidelines of Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.67, "Accident Source Term."

The RWM function is automatically bypassed at power levels greater than 10 percent rated thermal power because there are sufficient void concentrations to preclude a CRDA exceeding 280 cal/g peak fuel enthalpy. At power levels less than 10 percent rated thermal power, the RWM may be manually bypassed by specific procedural control with verification by a second license operator (or qualified member of the technical staff) that the first operator is performing control rod movements in accordance with the BPWS.

For continued rod movement with the RWM inoperable, TS 3.3.2.1 Condition C requires either suspension of control rod movement with the exception of a scram, or one of the following: (1) verification that at least 12 control rods are withdrawn, and verification that control rod movement is in compliance with BPWS by a second licensed operator or other qualified member of the technical staff, or (2) verification that reactor startup with the RWM inoperable has not been performed in the last calendar year, and verification that control rod movement is in compliance with BPWS by a second licensed operator or other qualified member of the technical staff.

TVA stated that the proposed change to Required Action C.2.1.2 to allow an unrestricted number of reactor startups with the RWM inoperable, provided that control rod coupling checks have been performed prior to a reactor restart, provides another layer of defense by breaking the sequence of events that would be required to lead to a CRDA, rendering this accident unfeasible. The NRC staff asked if the control rod coupling checks are required to be performed regardless of the proposed LAR. TVA confirmed that its operating procedures require a coupling integrity check any time a control rod is fully withdrawn, and that this check is required by TS SR 3.1.3.5. TVA stated that in addition to performing the coupling checks every time a rod is fully withdrawn, it will also make sure that the checks are done for the first 12 rods prior to start up (prior to transitioning to Mode 2). The NRC staff asked if this would be a change in the startup procedures. TVA responded saying it needs to work through where the change will be included (e.g., startup procedure or an activity with documentation).

TVA noted that since the RWM operability requirements were added to the Standard Technical Specifications, continued studies of CRDA methodology and results have indicated a substantial reduction in enthalpy for a given rod worth as a result of better core geometry and moderator reactivity modeling. These results suggest that the CRDA probability is likely less than previously analyzed, and that the reliance on the RWM is outdated.

The CRDA postulates the de-coupling of a fully inserted control rod from its drive while remaining in the fully inserted position. The scenario then assumes the dropping of the rod results in a high local reactivity in a small region of the core. For large, loosely coupled cores, significant shifts in the spatial power generation are expected during the course of the excursion.

Adherence to BPWS when reactor power is less than 10 percent rated thermal power limits the worth of the postulated dropped rod and ensure that the initial conditions of the CRDA analysis are not violated. The RWM does not mitigate or prevent a CRDA. This accident is mitigated by the average power range monitor, which generates a high flux scram signal to the reactor protection system, resulting in an automatic scram of the reactor.

Existing calculations demonstrate that no significant CRDA can occur above 10 percent rated thermal power due to increased voiding in the core, which flattens the flux profile surrounding a control rod. Therefore, the CRDA is not considered at higher power levels. The CRDA is not expected to occur during the lifetime of the plant (10-12 per reactor year) and is not modeled in the probabilistic risk assessment for Browns Ferry due to the specific system failures and personnel errors that would have to occur in the correct combination and sequence to present the reactivity required for a design basis CRDA. The proposed change breaks the chain of events required for a CRDA to occur, further decreasing the probability of occurrence. The inadvertent operator-initiated withdrawal of a single control rod from the core is classified as a non-limiting transient event.

The rod withdrawal error (RWE) at low power is categorized as an infrequent accident and is not considered credible during reactor startup or during low power ranges. The RWE accident, like a CRDA, is contingent upon specific failures occurring in a specific sequence: failure of the RWM, operator selecting an out-of-sequence rod with a high worth, and disregarding continuous alarm annunciations. In the event the RWM is inoperable during reactor startup, the RWE occurrence is precluded by a second licensed operator or qualified member of the technical staff verifying control rod movements comply with BPWS. The use of a second operator was found to be acceptable in development of the Improved Standard Technical Specifications. TVA has determined that neither the CRDA or RWE analyses are adversely impacted by the proposed amendment.

The NRC staff requested that for any references to any topical reports will be in the LAR, that TVA provide the citation. TVA confirmed that it will provide the appropriate citations.

TVA stated that it plans to submit the LAR by July 30, 2025.

No regulatory decisions were made at this meeting.

No comments or public meeting feedback forms were received.

Please direct any inquiries to me at 301-415-1627 or Kimberly.Green@nrc.gov.

/RA/

Kimberly J. Green, Senior Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-259, 50-260 and 50-296

Enclosure:
List of Attendees

cc: Listserv

LIST OF ATTENDEES

JULY 14, 2025, TELECONFERENCE WITH TENNESSEE VALLEY AUTHORITY

PROPOSED LICENSE AMENDMENT REQUEST REGARDING REVISION TO TS 3.3.2.1 FOR

ROD WORTH MINIMIZER

BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2, AND 3

Name	**Organization**
Kim Green	U.S. Nuclear Regulatory Commission (NRC)
Camille Peres	NRC
Norbert Carte	NRC
Joseph Messina	NRC
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David Renn	TVA
Greg Cobb	TVA
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Brian Elder	TVA
Joseph Carver	TVA
Shantavia McCurdy	TVA

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ADAMS Accession Nos.:
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ML25182A016 (Meeting Notice)
ML25199A170 (Meeting Summary) **NRC-001**

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