

U. S. NUCLEAR REGULATORY COMMISSION
FINAL SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
FOR WESTINGHOUSE ELECTRIC COMPANY
“REQUEST TO MODIFY SAFETY EVALUATION REPORT ON WCAP-12472-P-A,
‘BEACON™: CORE MONITORING AND OPERATIONS SUPPORT SYSTEM’”

WESTINGHOUSE ELECTRIC COMPANY

1.0 INTRODUCTION

By letter dated September 9, 2019 (Ref. 3), Westinghouse Electric Company (Westinghouse) submitted to the U.S. Nuclear Regulatory Commission (NRC) a request to modify the safety evaluation (SE) previously approved for WCAP-12472-P-A, “BEACON™: Core Monitoring and Operations Support System.” Approval would permit licensees using the BEACON™ core monitoring system, with optimal core exit thermocouples (CETC) coverage, to change the surveillance interval/calibration requirements under certain conditions.

2.0 REGULATORY EVALUATION

Core Monitoring Systems (CMSs), in this case BEACON, are not directly addressed in regulations or in the NUREG-0800 Standard Review Plan (SRP). CMSs are utilized as a support system to monitor the operation of fuel while in the reactor. Therefore, the regulatory guidance for this review shall be that which governs nuclear fuel designs. Additionally, since this application modifies the surveillance criteria for reactor protection system instrumentation, the regulatory guidance for instrumentation & control (I&C) also applies.

Fuel designs must ensure that the reactor core will have the appropriate margin to assure that the specified acceptable fuel design limits criteria in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50 (Ref. 2), Appendix A, General Design Criterion (GDC) 10, “Reactor Design,” are met. Additionally, GDC 27, “Combined Reactivity Control System Capability,” and GDC 35, “Emergency Core Cooling,” require that licensees maintain control rod insertability and core coolability. Loss-of-coolant accident (LOCA) coolability requirements are contained in 10 CFR 50.46 (Ref. 2).

The NRC staff review guidance for nuclear fuel designs is contained in Standard Review Plan (SRP) Section 4.2 (Ref. 1).

The NRC staff review guidance for I&Cs is contained in SRP, Section 7.0, Revision 7, “Instrumentation and Controls - Overview of Review Process” (Ref. 5).

The guidance provided within the SRP forms the basis of the NRC staff’s review and ensures that the criteria of 10 CFR 50.46, GDCs 10, 27, and 35 are met.

Enclosure

An exhaustive search was performed on surveillance periodicity and there are no regulations governing the changes to surveillance/calibration periods that would prevent the change being requested. This is also true of the NRC staff's internal guidance. Moreover, the change being requested has no impact on any of the regulatory, GDC, or the NRC staff review guidance requirements stated above.

3.0 TECHNICAL EVALUATION

Westinghouse has requested that, with respect to BEACON CMS surveillance/calibration requirements within the NRC staff's prior SE, that a period of 30 effective full power days (EFPD) be changed to 31 EFPD. The specific instance is provided below (an excerpt (Section B of Reference 4) from the SE for BEACON):

The criteria for the exit thermocouples, with BEACON operable, which is presented in the example COLR section 2.4, require at least 25 percent of the thermocouples, with at least 2 per quadrant, with the added requirement that the operable pattern normally covers all internal fuel assemblies within a chess "knight" move (an adjacent plus a diagonal square away), or there must be more frequent calibration. Calibration, with the incores, is required every 180 effective full-power days. However, it is every 30 days when the knight move requirement is not satisfied.

It is clear from the reading of the NRC staff's prior SE for BEACON (Ref. 4) in its entirety that the 30 EFPD requirement was analogous to a monthly requirement.

The general practice of licensee's is to perform monthly surveillances at the beginning of each month as an aid to ensuring that all the licensee's surveillance requirements are met. It simplifies the scheduling of the massive number of required surveillances that performed to ensure safe operation of nuclear power plants. In the case of a hard 30 EFPD period requirement, the beginning of the month practice does not satisfy their surveillance requirements over the course of a year. In long months, the surveillance/calibration would need to be done twice or on an alternate schedule other than the beginning of the month. Thus, a change to 31 EFPD is requested for simplification purposes.

The NRC staff understands that the prior SE was imposing a monthly surveillance requirement and not a strict 30 EFPD requirement. If the case could be argued that the 30 EFPD period was a hard limit, which does not appear to be the case, then a change to extend to a 31 EFPD period is still acceptable because a 1 EFPD shorter surveillance/calibration period does NOT constitute a substantial increase in safety.

This interpretation is generic in nature and may be applied all the Westinghouse' methods that are used to analyze its nuclear fuel's performance. To state clearly, within Westinghouse topical reports (TRs) related to analyzing Westinghouse nuclear fuel performance (including neutronics, thermal hydraulic, mechanical, thermo-mechanical, LOCA and non-LOCA transient analysis methodologies) a surveillance requirement of 30 EFPD may be interpreted to mean 31 EFPD or monthly. This does not supersede the potential requirement for a licensing action if any 30 EFPD requirement is directly stated in a Licensee's Operating License/Technical Specifications.

4.0 LIMITATIONS AND CONDITIONS

The NRC staff approves the use of this request without any limitations or conditions.

5.0 CONCLUSION

The NRC staff reviewed the application for changing the periodicity of BEACON (Ref. 4) surveillance/calibration with CETCs from 30 EFPDs to 31 EFPDs when optimum core coverage is not maintained. The NRC staff found Westinghouse's basis for the change reasonable and justified and, therefore, acceptable.

Additionally, the staff found the requested change should be applicable to all of the Westinghouse's TRs that are used to analyze their nuclear fuel's performance. To state clearly, within Westinghouse' TRs related to analyzing Westinghouse nuclear fuel performance, any surveillance requirement of 30 EFPD may be interpreted to mean 31 EFPD or monthly. This does not supersede the potential requirement for a licensing action if any 30 EFPD requirement is directly stated in a Licensee's Operating License/Technical Specifications.

No request for additional information questions were issued as part of this review.

6.0 REFERENCES

1. NUREG-0800, "NRC Standard Review Plan," Section 4.2., Revision 3, "Fuel System Design," March 2007.
2. 10 CFR PART 50, "Domestic Licensing of Production and Utilization Facilities," 2019.
3. LTR-NRC-19-50, "Request to Modify Safety Evaluation Report on WCAP-12472-P-A, 'BEACON™: Core Monitoring and Operations Support System,'" September 9, 2019 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19253A107).
4. WCAP-12472-P-A, "BEACON Core Monitoring and Operations Support System," August 1994 (ADAMS Accession No. ML092050097).
5. NUREG-0800, "NRC Standard Review Plan," Chapter 7, Section 7.0, Revision 7, "Instrumentation and Controls - Overview of Review Process," August 2016.

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