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10 CFR 50, Appendix H

Serial: RNP-RA/11-0038

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0011

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/RENEWED LICENSE NO. DPR-23

REVISION TO REACTOR VESSEL SURVEILLANCE CAPSULE REMOVAL SCHEDULE

Ladies and Gentlemen:

Pursuant to Appendix H of Title 10 of the Code of Federal Regulations (10 CFR), Part 50, Carolina Power and Light Company (CP&L) now doing business as Progress Energy Carolinas, Inc. (PEC), is requesting Nuclear Regulatory Commission (NRC) review and approval of the enclosed revision to the reactor vessel (RV) surveillance capsule removal schedule for H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2.

The proposed RV surveillance capsule removal schedule was developed to address the need for RV property data at fluences representative of 60 years of operation and beyond for HBRSEP and the industry. The requested change has been prepared in accordance with recommendations from the Electric Power Research Institute (EPRI) Materials Reliability Program (MRP) draft of the Coordinated U.S. PWR Reactor Vessel Surveillance Program dated August, 2011. The requested change to the Appendix H program for HBRSEP satisfies the requirements and guidance of American Society for Testing and Materials (ASTM) E185-82, "Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels", dated July 1, 1982.

This document contains the following regulatory commitment:

Capsule U will be withdrawn at 38.0 EFPY or during the scheduled outage after the 80 year peak vessel fluence is reached.

The above commitment replaces the existing commitment to withdraw capsule U during refueling outage 27 (spring 2012).

Approval of this proposed change is requested no later than November 30, 2011.

Progress Energy Carolinas, Inc.
Robinson Nuclear Plant
3581 West Entrance Road
Hartsville, SC 29550

A008
NRC

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Please refer any questions regarding this submittal to me at (843) 857-2616.

Sincerely,



Rich Rogalski

Supervisor – Licensing/Regulatory Programs

PSF

Enclosure: 1. Description and Evaluation of the Proposed Change
 2. Regulatory Commitment

cc: V. M. McCree, NRC Regional Administrator, Region II
 B. L. Mozafari, NRC Project Manager, NRR
 NRC Sr. Resident Inspector, RNP

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Summary

This evaluation supports a request from Carolina Power & Light Company (CP&L), now doing business as Progress Energy Carolinas, Inc. (PEC), to revise the reactor vessel surveillance program (RVSP) capsule withdrawal schedule for the H.B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2.

The proposed revision would align the HBRSEP withdrawal schedule with the projections of neutron fluence for the unit at the end of life for extended operations while still satisfying the requirements of American Society for Testing and Materials (ASTM) E185-82, "*Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels*". The HBRSEP RV surveillance capsule withdrawal schedule presently includes removal and subsequent testing of surveillance Capsule U during the 27th refueling outage (Spring 2012). HBRSEP is requesting approval to revise the RV surveillance capsule withdrawal schedule and remove Capsule U at 38.0 EFPY or during the scheduled outage after the 80 year 66 EFPY peak vessel fluence is reached.

This submittal is made in accordance with the provision of 10 CFR 50, Appendix H, "*Reactor Vessel Material Surveillance Program Requirements*." Paragraph (III)(B)(3) specifies that a proposed withdrawal schedule must be submitted with a technical justification as specified by 10 CFR 50.4, and that the proposed schedule must be approved prior to implementation.

Background

HBRSEP has reviewed the current site RV surveillance capsule withdrawal schedule to assess the need identified by the Industry to generate higher-fluence surveillance data while maintaining compliance with existing regulations and commitments of Appendix H to 10 CFR 50 and ASTM E185-82. HBRSEP has determined that a change to the 10 CFR 50 Appendix H schedule is appropriate.

The Electric Power Research Institute (EPRI) Materials Reliability Program (MRP) is currently developing a Coordinated Reactor Vessel Surveillance Program (CRVSP) for PWRs for the purpose of increasing the population of higher-fluence surveillance data ($>3E+19$ n/cm², E > 1 MeV). The general premise of the program is to defer the withdrawal of certain capsules (e.g., those capsules which can provide high-fluence data for specific materials of interest before ~2025) while maintaining compliance with 10 CFR 50 Appendix H and Revision 2 of NUREG-1801, "*Generic Aging Lessons Learned (GALL) Report*." Revision 2 of the "*GALL Report*" is cited because it recommends license renewal capsule testing be performed between one and two times the 60-year peak reactor pressure vessel (RPV) fluence, as compared to guidance in Revision 1 of the "*GALL Report*" to test the capsule at the 60 year fluence.

The CRVSP is a program of capsule deferrals (schedule changes) but it does not alter any plant's overall surveillance program or its technical bases; the changes that will be recommended by the CRVSP are within the original licensing basis for every PWR. NRC Staff were briefed on this program in an MRP/PWROG Meeting on January 6, 2011. A report is in preparation but is not

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ready for submission to cognizant MRP committees for approval; the report is expected to be submitted by the end of 2011. However, several plants have plans for withdrawal and testing of surveillance capsules in 2011 and 2012, and require alteration to their Appendix H capsule withdrawal schedule prior to the time that the final report can be approved, published, and implemented. The EPRI MRP is coordinating with plants that have near-term withdrawals scheduled to identify cases where a deferral of their current withdrawal schedule date (in 2011 or 2012) to a later date or the test of a different capsule in the future would significantly contribute to the overall program's goal of increasing the amount of higher-fluence surveillance data. HBRSEP is in this group of plants.

Current RVSP Withdrawal Schedule for HBRSEP

The currently approved reactor vessel surveillance capsule removal schedule is as follows:

The following shows the UFSAR schedule for removal of the Reactor Vessel Materials Surveillance Capsules U, Y, and W:

<u>Capsule</u>	<u>Effective Full Power Years (See Note 1)</u>
U (See Note 2)	29.8
Y (See Note 3)	Reserve
W (See Note 3)	Reserve

Note 1: Capsules are to be removed during the refueling outage immediately after or prior to the designated life.

Note 2: Capsule to location 280° at Cycle 8. Capsule U will reach a fluence of approximately 6.00×10^{19} n/cm² (50 EFPY peak fluence) at approximately 29.8 EFPY. Thus, Capsule U should be withdrawn at the closest outage to 29.8 EFPY.

Note 3: Capsules Y and W will be repositioned after 40 calendar years to accelerated flux positions to provide additional support for license extension.

The HBRSEP reactor vessel surveillance program was designed to comply with the requirements of ASTM E185-82.

Proposed Schedule Change for HBRSEP

HBRSEP proposes to remove U at 38.0 EFPY. This withdrawal schedule is as recommended by MRP in the Coordinated U.S. PWR Reactor Vessel Surveillance Program. At that time, Capsule U will have reached a fluence equivalent to the 80-year (66 EFPY) RPV peak fluence. Based on the estimated 40-year (29 EFPY) fluence of 3.67×10^{19} n/cm² and the 60-year (50 EFPY) fluence of 6.00×10^{19} n/cm², the 80-year (66 EFPY) peak RPV fluence is estimated to be 7.79×10^{19} n/cm². The proposed revised withdrawal schedule is as follows:

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<u>Capsule</u>	<u>Effective Full Power Years</u>
U (See Note 1)	38.0
Y (See Note 2)	Reserve
W (See Note 2)	Reserve

Note 1: Capsule to location 280° at Cycle 8. Capsule U will reach a fluence of approximately 7.84×10^{19} n/cm² (66 EFPY peak fluence) at approximately 38.0 EFPY. Thus, Capsule U should be withdrawn at 38.0 EFPY or during the scheduled outage after the 80 year peak vessel fluence is reached.

Note 3: Capsules Y and W will be repositioned after 40 calendar years to accelerated flux positions to provide additional support for license extension.

Upon NRC approval, the UFSAR will be updated to reflect this change.

Regulatory Evaluation

10 CFR 50.60, *“Acceptance Criteria for Fracture Prevention Measures for Lightwater Nuclear Power Reactors for Normal Operation”* and 10 CFR 50, *“Appendix H, Reactor Vessel Material Surveillance Program Requirements”*

The NRC has established requirements and criteria in 10 CFR 50.60 for protecting the reactor vessels of light-water reactors (LWRs) against fracture. The rule requires light-water nuclear power reactors to meet the RV fracture toughness and material surveillance program requirements set forth in Appendix G and H to 10 CFR Part 50.

Appendix H to 10 CFR Part 50 provides the NRC staff's criteria for the design and implementation of RV material surveillance programs for operating LWRs. Paragraph (III)(B)(1) requires that surveillance program design and withdrawal schedule meet the requirements of the ASTM E185 that is current on the issue date of the ASME Code to which the RV was purchased. Later editions of ASTM E185 may be used, but including only those editions through 1982 (ASTM E185-82). The rule, in Paragraph (III)(B)(3), requires that a proposed withdrawal schedule be submitted with a technical justification and approved prior to implementation.

NRC Administrative Letter (AL) 97-004, *“NRC Staff Approval for Changes to 10 CFR Part 50, Appendix H, Reactor Vessel Surveillance Specimen Withdraw Schedules”*

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In AL 97-004, the NRC found that while 10 CFR Part 50, Appendix H, requires prior NRC approval for all withdrawal schedule changes, only certain changes require the NRC staff to review and approve the changes through the NRC's license amendment (10 CFR 50.90) process. Specifically, only those changes that are not in conformance with the ASTM standard referenced in 10 CFR Part 50, Appendix H (ASTM E185), are required to be approved through the license amendment process, whereas changes that are determined to conform to the ASTM standard only require that the NRC staff document its review and verification of such conformance.

Precedent

The following approved changes to licensee surveillance specimen withdrawal schedules:

1. Letter from NRC to Virginia Electric and Power Company, "Surry Power Station, Unit Nos. 1 and 2 – Safety Evaluation for Revision to Reactor Vessel Surveillance Capsule Withdrawal Schedule" dated January 31, 2011, ADAMS Accession Number ML103000386.
2. Letter from NRC to Entergy Nuclear Operations, Inc, "Indian Point Nuclear Generating Unit No. 2 – Reactor Vessel Surveillance Capsule Withdrawal Schedule Change" dated March 15, 2010, ADAMS Accession Number ML100640409.
3. Letter from NRC to Calvert Cliffs Nuclear Plant, LLC, "Calvert Cliffs Nuclear Power Plant, Unit No. 1 – Reactor Vessel Surveillance Capsule Withdrawal Schedule Change" dated March 12, 2010, ADAMS Accession Number ML100690393.
4. Letter from NRC to STP Nuclear Operating Company, "South Texas Project 1 and 2: Safety Evaluation for Revision to Reactor Vessel Surveillance Capsule Withdrawal Schedules" dated August 5, 2009, ADAMS Accession Number ML091900724.

Technical Justification

NUREG-1801, "*GALL Report*", Revision 2, recommends that:

- "The plant-specific or integrated surveillance program shall have at least one capsule with a projected neutron fluence equal to or exceeding the 60-year peak reactor vessel wall neutron fluence prior to the end of the period of extended operation. The program withdraws one capsule at an outage in which the capsule receives a neutron fluence of between one and two times the peak reactor vessel wall neutron fluence at the end of the period of extended operation and tests the capsule in accordance with the requirements of ASTM E 185-82." and
- "Plant-specific and fleet operating experience should be considered in determining the withdrawal schedule for all capsules..."

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The proposed withdrawal date for Capsule U meets both of these recommendations. The operating experience of both HBRSEP and the U.S. PWR fleet were considered in the development of the revised capsule withdrawal schedule. The operating experience of the fleet and the plant is that the average peak RPV fluence for the U.S. PWR fleet will average $\sim 4.1E+19$ n/cm² (E > 1 MeV) for 60 year licenses and $\sim 5.6E+19$ n/cm² (E > 1 MeV) for 80 year licenses; however, there is a limited amount of U.S. PWR surveillance data above $3E+19$ n/cm² (E > 1 MeV). Surveillance data representative of the extended license fluence levels is desirable for both HBRSEP and the PWR fleet because that data can better inform future embrittlement trend curve development. The capsule fluence at the proposed withdrawal date will meet the guidance that the license renewal capsule should achieve a fluence between one and two times the peak reactor vessel wall neutron fluence at the end of the period of extended operation.

The "GALL Report", Revision 2, is cited as it represents the latest guidance provided by the Staff. No request to revise the licensing basis of the HBRSEP renewed operating license is implied by this citation; it is offered only as a reference and objective evidence to support the Technical Justification for the deferral.

References

1. 10 CFR 50.60, "Acceptance Criteria for Fracture Prevention Measures for Lightwater Nuclear Power Reactors for Normal Operation."
2. 10 CFR 50 Appendix H, "Reactor Vessel Material Surveillance Program Requirements."
3. NRC Administrative Letter 97-04, "NRC Staff Approval for Changes to 10 CFR 50, Appendix H, Reactor Vessel Surveillance Specimen Withdrawal Schedules," dated September 30, 1997.
4. ASTM-E-185-82, "Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels."
5. NUREG-1801, "Generic Aging Lessons Learned (GALL) Report."

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Regulatory Commitment

The action in this document committed to by H. B. Robinson Steam Electric Plant, Unit No. 2 (HBRSEP), is identified in the following table. Statements in this submittal, with the exception of those in the table below, are provided for information purposes and are not considered regulatory commitments. Please direct any questions regarding this document or any associated regulatory commitments to the HBRSEP Supervisor-Licensing/Regulatory Programs.

Item	Commitment
1	Capsule U will be withdrawn at 38.0 EFPY or during the scheduled outage after the 80 year peak vessel fluence is reached.