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

February 3, 2009

Mr. James A. Spina, Vice President
Calvert Cliffs Nuclear Power Plant, Inc.
Calvert Cliffs Nuclear Power Plant
1650 Calvert Cliffs Parkway
Lusby, MD 20657-4702

SUBJECT: REVISION TO REACTOR VESSEL SURVEILLANCE CAPSULE WITHDRAWAL SCHEDULE - CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NOS. 1 AND 2 (TAC NOS. MD9344 AND MD9345)

Dear Mr. Spina:

By letter dated July 29, 2008, Calvert Cliffs Nuclear Power Plant, Inc., the licensee, submitted a request to revise the withdrawal schedule for the reactor pressure vessel (RPV) surveillance capsules for the Calvert Cliffs Nuclear Power Plant (CCNPP), Unit Nos. 1 and 2. The purpose of the licensee's submittal was to align the withdrawal schedule with the current projections of neutron fluence for the two units and still satisfy the requirements of the American Society for Testing and Materials (ASTM) Standard E185-82, "Standard Practice for Conducting Surveillance Test for Light-Water Cooled Nuclear Power Reactor Vessels."

The Nuclear Regulatory Commission staff has completed its review and concludes that the proposed withdrawal schedule for CCNPP, Unit Nos. 1 and 2, meets the requirements of ASTM E185-82 and Appendix H to Title 10 of the *Code of Federal Regulations,* Part 50, "Reactor Vessel Material Surveillance Program Requirements," and is, therefore, acceptable. The staff's safety evaluation report is enclosed.

Sincerely,

Douglas V. Pickett

Douglas V. Pickett, Senior Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-317 and 50-318

Enclosure:
As stated

cc w/encl: Distribution via Listserv

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REVISION TO REACTOR VESSEL SURVEILLANCE CAPSULE WITHDRAWAL SCHEDULE

CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NOS. 1 AND 2

DOCKET NOS. 50-317 AND 50-318

1.0 INTRODUCTION

By letter dated July 29, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML082110562), Calvert Cliffs Nuclear Power Plant, Inc., the licensee, submitted a request to revise the withdrawal schedule for the reactor pressure vessel (RPV) surveillance capsules for Calvert Cliffs Nuclear Power Plant (CCNPP), Unit Nos. 1 and 2. The purpose of the licensee's submittal was to align the withdrawal schedule with the current projections of neutron fluence for the two units and still satisfy the requirements of the American Society for Testing and Materials (ASTM) Standard E185-82, "Standard Practice for Conducting Surveillance Test for Light-Water Cooled Nuclear Power Reactor Vessels."

2.0 REGULATORY REQUIREMENTS

Appendix H to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, "Reactor Vessel Material Surveillance Program Requirements," (Appendix H) requires licensees to monitor changes in the toughness properties of ferritic materials in the RPV beltline region of light water nuclear power reactors. The surveillance program at CCNPP, which was established in accordance with Appendix H, monitors the radiation-induced changes in the tensile and impact properties of the RPV materials.

Appendix H further states that the design of the surveillance program and the withdrawal schedule must meet the requirements of the edition of the ASTM E185 that was current on the issue date of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) to which the RPV was purchased; however, the licensee may choose to use later editions of the ASTM specification, through the 1982 edition. For CCNPP, Unit Nos. 1 and 2, the applicable edition was ASTM E185-70, which was the edition of ASTM E185 that was in effect on the issue date of Section III of the ASME Code (1965 Edition through Winter 1967 Addenda), to which the pressure vessels were designed. The current surveillance programs have been developed in accordance with ASTM E185-82 rather than the earlier E185-70 version so that the withdrawal schedule could be dictated by the RPV fluence targets, as discussed in Attachment 1 to the licensee's application dated July 29, 2008.

In addition, Item 69 in Appendix E of NUREG-1705 (ADAMS Accession No. ML063620322), "Safety Evaluation Report Related to the License Renewal of Calvert Cliffs Nuclear Power Plant, Units 1 and 2," placed a specific requirement on the licensee to modify the surveillance capsule withdrawal program based on the extended life of the RPV granted in the license renewal. The

goal of the modification should be to "provide reasonable assurance that the affects of neutron irradiation on the CCNPP RPVs will be managed."

The relevant criteria of ASTM E185-82, as summarized in the relief request, state the following:

Capsule No.	Fluence Target
3rd	At a time when the accumulated neutron fluence on the capsule corresponds to the approximate end of life (EOL) fluence at the reactor vessel ¼ T location.
4th	At a time when the accumulated neutron fluence on the capsule corresponds to the EOL fluence at the reactor vessel inner wall location.
5th	Not less than one or greater than twice the peak EOL vessel fluence. The capsule may be held without testing following withdrawal.

3.0 TECHNICAL EVALUATION

CCNPP has five surveillance capsules for each unit to provide sufficient RPV material property changes and fluence information as recommended in ASTM E185-82 to meet the requirements of 10 CFR Part 50, Appendix H. Each CCNPP unit also has an additional standby surveillance capsule to meet future needs (e.g., life extension, radical fuel management changes, etc.), as required.

As discussed in Attachment 1 to the licensee's letter dated July 29, 2008, the approved withdrawal schedules for the two units (based on 5 capsules with the 6th as a standby) are in accordance with ASTM E185-82. The schedule for Unit No. 1 was revised in March 2008 while the schedule for Unit No. 2 was last revised in June 2000. The first two capsules for both Unit Nos. 1 and 2 have been withdrawn and analyzed. The remainder of the current surveillance withdrawal schedule is based on approximate extended end-of-life (EEOL) fluence at the inside diameter (ID) of RPV of 5.26×10^{19} n/cm^2 for Unit No. 1 and 5.74×10^{19} n/cm^2 (E>1.0 MeV) for Unit No. 2.

3.1 CCNPP, Unit No. 1

The latest projection for the peak EEOL fluence, 5.26×10^{19} n/cm^2 (E>1.0 MeV), at the ID has not changed, but the licensee has asked to delay the schedule for removal of the 4th and 5th capsules (the schedule for the 3rd capsule was changed in March 2008 to reflect the current fluence projection).

Under the current schedule, the 4th capsule would be removed in 2018 when the projected fluence at the ID of the RPV is 5.09×10^{19} n/cm^2 (E>1.0 MeV), which is slightly less than the EEOL fluence. By revising the withdrawal date back to 2020, the licensee can obtain mechanical property data for the surveillance materials at a fluence that matches the current EEOL fluence, 5.26×10^{19} n/cm^2 (E>1.0 MeV), which is in accordance with ASTM E185-82.

Under the current schedule, the 5th capsule would be removed in 2030 when the projected fluence at the ID of the RPV is 6.26 x 10^{19} n/cm^2 (E>1.0 MeV), which is greater than once but less than twice the EEOL fluence. By revising the withdrawal date back to 2032, the licensee can obtain mechanical property data for the surveillance materials at a higher fluence, 6.59 x 10^{19} n/cm^2 (E>1.0 MeV), and still meet the requirements of ASTM E185-82.

3.2 CCNPP, Unit No. 2

The latest projection for the EEOL fluence at the ID has changed since the schedule for Unit No. 2 was last revised in June 2000. The new projected EEOL fluence at the ID of the RPV is 6.16 x 10^{19} n/cm^2 (E>1.0 MeV). Given the latest fluence projection, the licensee has asked to delay the schedule for removal of the 3rd, 4th and 5th capsules; these proposed changes are discussed below.

The current schedule for the 3rd capsule has it being removed in 2009 after being exposed to a fluence of 3.02 x 10^{19} n/cm^2 (E>1.0 MeV). The licensee's letter of July 29, 2008, states that the latest EEOL fluence projection for Unit No. 2 at the ¼ T location is slightly higher, 3.24 x 10^{19} n/cm^2 (E>1.0 MeV). The requirements of ASTM E185-82 would be better served by delaying the removal of this capsule until 2011 when the actual fluence on the capsule equals the ¼T EEOL fluence projection of 3.24 x 10^{19} n/cm^2 (E>1.0 MeV).

Under the current schedule, the 4th capsule would be removed in 2023 when the projected fluence at the ID of the RPV is 5.74 x 10^{19} n/cm^2 (E>1.0 MeV), which is slightly less than the EEOL ID fluence. By revising the withdrawal date back to 2025, the licensee can obtain mechanical property data for the surveillance materials at a fluence that matches the current EEOL ID fluence projection of 6.16 x 10^{19} n/cm^2 (E>1.0 MeV).

Under the current schedule, the 5th capsule would be removed in 2031 when the projected fluence at the ID of the RPV is 6.96 x 10^{19} n/cm^2 (E>1.0 MeV), which is greater than once but less than twice the EEOL fluence. By revising the withdrawal date back to 2033, the licensee can obtain mechanical property data for the surveillance materials at a higher fluence of 7.46 x 10^{19} n/cm^2 (E>1.0MeV), and still meet the requirements of ASTM E185-82.

4.0 CONCLUSION

Based on the NRC staff review of the submittal, the staff found that the revised withdrawal schedule for the CCNPP, Unit Nos. 1 and 2 surveillance capsules satisfy the requirements of ASTM E185-82 and Appendix H to 10 CFR Part 50. In addition, the staff found that the revised withdrawal schedules for CCNPP still fulfill the commitment associated with item 69 in Appendix E of NUREG-1705 for the renewed license period of 60 years. Therefore, the staff concludes that the licensee's revisions to the RPV surveillance capsule withdrawal schedules for CCNPP, Unit Nos. 1 and 2 are acceptable.

Principal Contributor: Patrick Purtscher

Date: February 3, 2009

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Mr. James A. Spina, Vice President
Calvert Cliffs Nuclear Power Plant, Inc.
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Sincerely,
/RA/
Douglas V. Pickett, Senior Project Manager
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