ATTACHMENT (1)

PROPOSED REVISION TO THE SCHEDULE FOR WITHDRAWAL OF REACTOR VESSEL MATERIAL SURVEILLANCE CAPSULES FOR CALVERT CLIFFS UNITS 1 AND 2

Calvert Cliffs Nuclear Power Plant, Inc.
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I. BACKGROUND

Appendix H of 10 CFR Part 50 describes reactor vessel material surveillance program requirements. Paragraph (III)(B)(3) of this Appendix states that a proposed material withdrawal schedule must be submitted with a technical justification per 10 CFR 50.4, and approved prior to implementation.

As is the case with the currently approved withdrawal schedule, the proposed withdrawal schedule satisfies the requirements of American Society for Testing and Materials (ASTM) E185-70, the version that was current at the time the reactor vessel surveillance program was designed. In addition, to the extent practicable, both the proposed and the currently approved withdrawal schedules comply with ASTM E185-82.

Tables (1) and (2) show the currently approved withdrawal schedule for Calvert Cliffs Units 1 and 2 reactor vessel surveillance capsules, respectively (References 1 and 2).

II. PROPOSED REVISION TO THE WITHDRAWAL SCHEDULE

Tables (3) and (4) provide the proposed revisions to the reactor vessel surveillance capsule withdrawal schedules for Units 1 and 2, respectively. The revised schedules are based on ASTM E185-82 recommendations and reflect updated fluence information from the surveillance capsules removed in 1992 and 1993 (Units 1 and 2, respectively) with appropriate adjustment made for fuels loaded in subsequent cycles. As shown below in Section III, the proposed withdrawal schedules satisfy the requirements of ASTM E185-70, the version that was current at the time the reactor vessels were designed. Therefore, the withdrawal schedules satisfy the requirements of Appendix H to 10 CFR Part 50.

III. JUSTIFICATION

The Calvert Cliffs reactor vessels were designed to the 1965 through winter 1967 Addenda, edition of the American Society of Mechanical Engineers Code. The ASTM E185-70 was the current standard when the surveillance program was designed. As stated in the Calvert Cliffs Updated Final Safety Analysis Report, the reactor vessel surveillance program meets the requirements of ASTM E185-70.

The guidance provided in ASTM E185-82 is consistent with, but more specific than, the guidance provided in earlier editions, including ASTM E185-70 to which the Calvert Cliffs reactor vessels' surveillance program is required to conform. Therefore, compliance with the ASTM E185-82 withdrawal schedule guidance ensures compliance with ASTM E185-70 withdrawal schedule guidance. The ASTM E185-82 provides a withdrawal schedule in terms of years of operation but also provides the option to develop a schedule tied to target fluences accumulated in the vessel. As in the case of the currently approved withdrawal schedule, the proposed withdrawal schedule follows the guidance that ties the withdrawal schedule to vessel fluence targets. The target fluence guidance is as follows:

Capsule No.	Fluence Target
1.	When the accumulated neutron fluence of the capsule exceeds $5x10^{18}$ n/cm^2, or when the highest predicted delta RT_{NDT} (nil-ductility reference temperature) of all encapsulated materials is approximately 28°C (50°F), whichever comes first.

Capsule No.	Fluence Target
2.	At a time when the accumulated neutron fluence of the capsule corresponds to a value midway between the first and the third capsules.
3.	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.
4.	At a time when the accumulated neutron fluence on the capsule corresponds to the approximate EOL fluence at the reactor vessel inner wall location.
5.	Not less than once or greater than twice the peak EOL vessel fluence. The capsule may be held without testing following withdrawal.

The current fluence projections for the extended end-of-life (EEOL) for Unit 1 vessel are:

- EEOL vessel ¼ T fluence – 3.06×10^{19} n/cm^2
- EEOL vessel ID fluence – 5.26×10^{19} n/cm^2
- 2 X EEOL vessel ID fluence – 10.52×10^{19} n/cm^2

The current fluence projections for the EEOL for Unit 2 vessel are:

- EEOL vessel ¼ T fluence – 3.24×10^{19} n/cm^2
- EEOL vessel ID fluence – 6.16×10^{19} n/cm^2
- 2 x EEOL vessel ID fluence – 12.32×10^{19} n/cm^2

Calvert Cliffs' first two capsules for each Unit have been withdrawn and analyzed. As shown in Tables 3 and 4, the remaining capsules are fit to the criteria for capsules 3, 4, and 5 using the above fluence projections. The 6th capsule will be a spare.

IV. REFERENCES

(1) Letter from Mr. A. W. Dromerick (NRC) to Mr. C. H. Cruse (BGE), dated November 8, 2000, "Safety Evaluation of Request to Revise Reactor Pressure Vessel Surveillance Program Schedule for Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2 (TAC Nos. MA9370 and MA9371)"

(2) Letter from Mr. D. V. Pickett (NRC) to Mr. J. A. Spina, dated April 9, 2008, Revision to Reactor Pressure Vessel Surveillance Capsule Withdrawal Schedule (TAC No. MD8235)

Table (1)

Current Unit 1 Reactor Vessel Surveillance Program Capsule Removal Schedule (approved 2000 and 2008)

Capsule Azimuthal Position	Target Fast Neutron Fluence ($x\ 10^{19}$ n/cm^2)	Projected End-of-Cycle Date
263°	0.62 [a]	Withdrawn, 1979
97°	2.64 [b]	Withdrawn, 1992
104°	3.06 [c]	2010
83°	5.09 [d]	2018
277°	6.26 [e]	2030
284°	STANDBY	

Notes:

[a] Actual capsule fluence [Perrin, J S, et al., "Calvert Cliffs Unit No. 1 Nuclear Plant Reactor Pressure Vessel Surveillance Program: Capsule 263," Battelle Columbus Laboratories, December 1980]

[b] Actual capsule fluence; [Lowe, A L, Jr., et al., "Analysis of Capsule 97° Baltimore Gas and Electric Company Calvert Cliffs Nuclear Power Plant Unit No. 1," B&W Nuclear Service Company, BAW-2160, June 1993]

[c] Withdrawal criteria – Capsule fluence that corresponds to the projected fluence at the vessel ¼ T location at the end-of-extended life ($3.06x10^{19}$ n/cm^2).

[d] Withdrawal criteria - Capsule fluence that corresponds to the projected fluence at the vessel inner wall location at end-of-extended life.

[e] Withdrawal criteria – Not less than once or greater than twice the peak end-of-extended life vessel fluence at the inner wall ($5.09x10^{19}$ <fluence in n/cm^2 <$10.18x10^{19}$). Note: this capsule also satisfied the requirement in the Nuclear Regulatory Commission (NRC) safety evaluation report for Calvert Cliffs license renewal, that one capsule containing dosimetry is to be removed during the final 5 years of the extended license.

Table (2)

Current Unit 2 Reactor Vessel Surveillance Program Capsule Removal Schedule (approved 2000)

Capsule Azimuthal Position	Target Fast Neutron Fluence ($x\ 10^{19}$ n/cm^2)	Projected End-of-Cycle Date
263°	0.806 [a]	Withdrawn, 1982
97°	1.85 [b]	Withdrawn, 1993
104°	3.02 [c]	2009
83°	5.74 [d]	2023
277°	6.96 [e]	2031
284°	STANDBY	

Notes:

[a] Actual capsule fluence [Norris, E. B., "Reactor Vessel Material Surveillance Program for Calvert Cliffs Unit 2 Analysis of 263° Capsule," Southwest Research Institute, SwRI-7524, September 1985]

[b] Actual capsule fluence [Lowe, A L, Jr., et al., "Analysis of Capsule 97° Baltimore Gas and Electric Company Calvert Cliffs Nuclear Power Plant Unit No. 2," B&W Nuclear Service Company, BAW-2199, February 1994]

[c] Withdrawal criteria - Capsule fluence that corresponds to the projected fluence at the vessel ¼ T location at end-of-extended life.

[d] Withdrawal criteria - Capsule fluence that corresponds to the projected fluence at the vessel inner wall location at end-of-extended life.

[e] Withdrawal criteria - Not less than once or greater than twice the peak end-of-extended life vessel fluence at the vessel inner wall ($5.74x10^{19}$ <fluence in n/cm^2 <$11.48x10^{19}$). Note: This capsule also satisfies the requirement in the NRC safety evaluation report for Calvert Cliffs license renewal, one capsule containing dosimetry is to be removed during the final 5 years of the extended license.

Table (3)

Proposed Unit 1 Reactor Vessel Surveillance Program
Capsule Removal Schedule

Capsule Azimuthal Position	Target Fast Neutron Fluence ($x\ 10^{19}$ n/cm^2)	Projected End-of-Cycle Date
263°	0.62 [a]	Withdrawn, 1979
97°	2.64 [b]	Withdrawn, 1992
104°	3.06 [c]	2010
83°	5.26 [d]	2020
277°	6.59 [e]	2032
284°	STANDBY	

Notes:

[a] Actual capsule fluence [Perrin, J S, et al., "Calvert Cliffs Unit No. 1 Nuclear Plant Reactor Pressure Vessel Surveillance Program: Capsule 263," Battelle Columbus Laboratories, December 1980]

[b] Actual capsule fluence; [Lowe, A L, Jr., et al., "Analysis of Capsule 97° Baltimore Gas and Electric Company Calvert Cliffs Nuclear Power Plant Unit No. 1," B&W Nuclear Service Company, BAW-2160, June 1993]

[c] Withdrawal criteria - Capsule fluence that corresponds to the projected fluence at the vessel ¼ T location at end-of-extended life.

[d] Withdrawal criteria - Capsule fluence that corresponds to the projected fluence at the vessel inner wall location at end-of-extended life.

[e] Withdrawal criteria - Not less than once or greater than twice the peak end-of-extended life vessel fluence at the vessel inner wall ($5.26x10^{19}$ <fluence in n/cm^2 <$10.52x10^{19}$). Note: This capsule also satisfies the requirement in the NRC safety evaluation report for Calvert Cliffs license renewal, that one capsule containing dosimetry is to be removed during the final 5 years of the extended license.

Table (4)

Proposed Unit 2 Reactor Vessel Surveillance Program
Capsule Removal Schedule

Capsule Azimuthal Position	Target Fast Neutron Fluence ($x\ 10^{19}$ n/cm^2)	Projected End-of-Cycle Date
263°	0.806 [a]	Withdrawn, 1982
97°	1.85 [b]	Withdrawn, 1993
104°	3.24 [c]	2011
83°	6.16 [d]	2025
277°	7.46 [e]	2033
284°	STANDBY	

Notes:

[a] Actual capsule fluence [Norris, E. B., "Reactor Vessel Material Surveillance Program for Calvert Cliffs Unit 2 Analysis of 263° Capsule," Southwest Research Institute, SwRI-7524, September 1985]

[b] Actual capsule fluence [Lowe, A L, Jr., et al., "Analysis of Capsule 97° Baltimore Gas and Electric Company Calvert Cliffs Nuclear Power Plant Unit No. 2," B&W Nuclear Service Company, BAW-2199, February 1994]

[c] Withdrawal criteria - Capsule fluence that corresponds to the projected fluence at the vessel ¼ T location at end-of-extended life.

[d] Withdrawal criteria - Capsule fluence that corresponds to the projected fluence at the vessel inner wall location at end-of-extended life.

[e] Withdrawal criteria - Not less than once or greater than twice the peak end-of-extended life vessel fluence at the vessel inner wall ($6.16x10^{19}$ <fluence in n/cm^2 <$12.32x10^{19}$). Note: This capsule also satisfies the requirement in the NRC safety evaluation report for Calvert Cliffs license renewal, one capsule containing dosimetry is to be removed during the final 5 years of the extended license.