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November 5, 2014

NL-14-129

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

SUBJECT: Proposed Revision to Reactor Vessel Surveillance Capsule Withdrawal Schedule
Per 10 CFR 50 Appendix H
Indian Point Unit Number 3
Docket No. 50-286
License No. DPR-64

REFERENCES:
1. NRC Administrative Letter 97-04, "NRC Staff Approval For Changes to 10 CFR 50, Appendix H, Reactor Vessel Surveillance Specimen".
2. ASTM Standard E 185-82, "Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels".

Dear Sir or Madam:

Entergy Nuclear Operations, Inc. (Entergy) hereby requests NRC approval of a revision to the reactor vessel surveillance capsule withdrawal schedule pursuant to 10 CFR 50, Appendix H, Section III.B.3 which requires that withdrawal schedules be submitted in accordance with 10 CFR 50.4 and that the proposed schedule must be approved by the NRC prior to implementation.

Reference 1 allows NRC approval of the proposed changes to the withdrawal schedule without a license amendment if the changes conform with the American Society for Testing and Materials (ASTM) Standard Practice E 185-82 (Reference 2). The proposed changes comply with the recommendations of ASTM Standard Practice E 1985-82 as discussed in Attachment 1.

Indian Point Unit 3 applied for a twenty year extension to the current operating license which is still under review. This letter proposes to change the surveillance capsule withdrawal schedule to cover the additional twenty year period of extended operation. As a result of this change, one additional capsule will be withdrawn during 3R23 (currently scheduled for March 2025) to be consistent with the requirements of ASTM E 185-82 for a sixty year operating period. Additional details are provided in Attachment 1.

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A copy of this application and the associated attachments are being submitted to the designated New York State official.

Entergy requests approval of the proposed amendment prior to the next IP3 refueling outage in March 2015 since the current schedule requires that one capsule be withdrawn at 25.5 effective full power years and none of the remaining capsules available for retrieval will have accumulated sufficient fluence to meet the ASTM E 185-82 requirements for a fifth capsule when considering the additional 20 years of operation.

There are no new commitments being made in this submittal.

If you have any questions or require additional information, please contact Mr. Robert Walpole, IPEC Regulatory Assurance Manager at (914) 254-6710.

I declare under penalty of perjury that the foregoing is true and correct. Executed on November 5, 2014.

Sincerely,

JAV/rw

Attachment: Proposed Revision to Reactor Vessel Surveillance Capsule Withdrawal Schedule Per 10 CFR 50 Appendix H

cc: Mr. Douglas Pickett, Senior Project Manager, NRC NRR DORL
Mr. David Lew, Acting Regional Administrator, NRC Region 1
NRC Resident Inspector
Mr. Francis J. Murray, Jr., President and CEO, NYSERDA
Ms. Bridget Frymire, New York State Dept. of Public Service

ATTACHMENT 1 TO NL-14-129

PROPOSED REVISION TO REACTOR VESSEL SURVEILLANCE CAPSULE WITHDRAWAL SCHEDULE PER 10 CFR 50 APPENDIX H

ENTERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NO. 3
DOCKET NO. 50-286

1.0 REQUIREMENTS

Appendix H of 10 CFR 50 (Reference 1) describes reactor vessel material surveillance program requirements. Paragraph (III)(B)(3) requires "A proposed withdrawal schedule must be submitted with a technical justification as specified in Section 50.4. The schedule must be approved prior to implementation." Reference 2 allows NRC approval of the proposed changes to the withdrawal schedule without a license amendment if the changes conform with the American Society for Testing and Materials (ASTM) standard E 185 (Reference 3).

2.0 PROPOSED CHANGES

The proposed change revises the withdrawal schedule for one of the surveillance capsules which remain in the reactor vessel by revising the withdrawal date from 15.5 EFPY to RFO 23 currently scheduled for March 2025. The current schedule and proposed changes are identified in Tables 1 and 2, respectively.

Table 1 - Current Withdrawal Schedule

CAPSULE	REMOVAL TIME
T	Removed (1978 Refueling Outage, At the Replacement of the First Region of the Core, 1.34 EFPY*)
Y	Removed (1982 Refueling Outage, 3.13 EFPY)
Z	Removed (1987 Refueling Outage, 5.55 EFPY)
S	**
X	Removed (2003 Refueling Outage, 15.6 EFPY)
U	30 Years or 25.5 EFPY, assuming an 85% capacity)
V	Standby
W	Standby

*NOTE: Effective full power years from plant startup.

**Capsule S, scheduled for removal in the 2001 outage, was found to be inaccessible due to equipment interference and has therefore been removed from the program. The schedule for specimen retrieval beyond Capsule Z was revised in 2003 in order to optimize the benefits gained from specimen analysis in the latter half of plant life.

The proposed revised schedule based on a 60 year operating life (equivalent to approximately 48 EFPY) is provide in Table 2 below and includes a change to the Capsule U withdrawal schedule

from 25.5 EFPY to RFO23 which corresponds to approximately 37 EFPY. This revised schedule allows capsule U to be subjected to a fluence which corresponds to a capsule fluence of not less than once and not more than twice the peak EOL vessel fluence for a 60 year operating life.

Table 2 - Proposed Revised Withdrawal Schedule[a]

Capsule	Location	Lead Factor	Withdrawal Date	Withdrawal EFPY[b]	Capsule Fluence (n/cm2)
T	40°	3.43	Removed 1978 Refueling Outage	1.4	2.63E+18
Y	40°	3.49	Removed 1982 Refueling Outage	3.2	6.92E+18
Z	40°	3.48	Removed 1987 Refueling Outage	5.5	1.04E+19
S	40°	3.46	[c]	N/A	N/A
X	4°	1.49	Removed 2003 Refueling Outage	15.5	8.74E+18
U	4°	1.52	RFO23	Approx. 37 EFPY	Approx. 1.86E+19
V	4°	1.52	Spare	N/A	N/A
W	4°	1.52	Spare	N/A	N/A

[a] The above schedule was obtained from reference 4 and updated for a 60 year operating period.

[b] Effective Full Power Years (EFPY) from plant startup.

[c] Retired in place.

3.0 TECHNICAL ANALYSIS

This request proposes to revise the reactor vessel surveillance capsule withdrawal schedule to ensure that the remaining capsules accumulate sufficient fluence to meet the requirements of ASTM E 185-82 for an extended operating period of up to 60 years. Removal and testing of one additional surveillance capsule during the period of extended operation will meet the requirements for a fifth capsule as required by ASTM E 185-82.

As listed in Tables 1 and 2 above, Indian Point Unit 3 has previously removed and tested four capsules and has four additional capsules remaining in the vessel. However, capsule S has been retired in place since previous attempts to remove this capsule were unsuccessful given its location in the vessel and the adjacent interferences which prevent the capsule removal tool from directly (i.e. vertically) accessing the capsule.

The Indian Point 3 reactor vessel is projected to reach a peak fluence at the clad/base metal interface of approximately 1.56×10^{19} n/cm^2 (E >1.0 MeV) (reference 5) by the end of extended operation (i.e. 60 calendar years or 48 Effective Full Power Years, EFPY). At the current projected flux for the period of extended operation, the three remaining capsules are projected to reach the vessel peak fluence of 1.56×10^{19} n/cm^2 (E >1.0 MeV) at approximately 31 EFPY. Assuming that the duration of future fuel cycles remains constant at approximately 1.9 EFPY per fuel cycle, the fluence for the remaining capsules is projected to reach approximately 1.86×10^{19} n/cm^2 (E >1.0 MeV) at approximately RFO23. To ensure that the next capsule has been exposed to a minimum

of 1.56 x 10^{19} n/cm^2 (E >1.0 MeV) plus an additional margin, the proposed schedule will require removal of the next capsule during RFO23 currently scheduled for March 2025 resulting in a capsule fluence of approximately 1.86 x 10^{19} n/cm^2 (E >1.0 MeV).

10CFR50, Appendix H requires that the surveillance capsule program "...must meet the requirements of the edition of ASTM E 185 that is current on the issue date of the ASME Code to which the reactor vessel was purchased". For IP3, this is the 1973 Edition of ASTM E 185. Appendix H also requires that "...For each capsule withdrawal, the test procedures and reporting requirements must meet the requirements of ASTM E 185-82 to the extent practicable for the configuration of the specimens in the capsule". Therefore, for IP3 the surveillance capsule withdrawal schedule is based on the 1973 Edition of ASTM E 185 although the IP3 schedule has been upgraded to meet the requirements of the 1982 Edition of ASTM E 185 to the extent practicable.

Since the peak ΔRT_{PTS} increase due to fluence exceeds 200^0 F, ASTM E 185 requires that five capsules be withdrawn. To date, four capsules have been withdrawn (capsules T, Y, Z and X) with four capsules (i.e. capsules S, U, W and V) remaining in the vessel. Capsule U is currently scheduled to be the fifth capsule and therefore satisfy the withdrawal requirements of ASTM E 185.

Compliance with the ASTM E 185-82 Withdrawal Requirements

First Capsule - Table 1 of ASTM E 185 requires that the first capsule be withdrawn at approximately 1.5 EFPY or at the time that the accumulated neutron fluence of the capsule exceeds 5 x 10^{18} n/cm^2 or at the time when the highest predicted ΔRT_{NDT} of all encapsulated materials is approximately 50^0 F, whichever comes first. Since capsule T was withdrawn at approximately 1.4 EFPY and the highest measured increase in ΔRT_{NDT} of all encapsulated materials was greater than 50^0 F, capsule T is considered to have met the requirements of ASTM E 185 for the first capsule.

Second Capsule – Table 1 of ASTM E 185 requires that the second capsule be withdrawn at approximately 3 EFPY or at the time the accumulated neutron fluence of the capsule corresponds to a value midway between that of the first and the third capsules. Since capsule Y was withdrawn at approximately 3.2 EFPY, capsule Y is considered to have met the requirements of ASTM E 185 for the second capsule.

Third Capsule - Table 1 of ASTM E 185 requires that the third capsule be withdrawn at approximately 6 EFPY or at the time when the accumulated neutron fluence of the capsule corresponds to the approximate EOL fluence at the reactor vessel ¼ T location, whichever comes first. The capsule fluence at the time of withdrawal was approximately 1.04 x 10^{19} n/cm^2 (reference 4) while the EOL fluence at the vessel ¼ T location is estimated at approximately 0.93 x 10^{19} n/cm^2 (reference 5). Since capsule Z was withdrawn at approximately 5.5 EFPY, capsule Z is considered to have met the requirements of ASTM E 185 for the third capsule.

Fourth Capsule - Table 1 of ASTM E 185 requires that the fourth capsule be withdrawn at approximately 15 EFPY or at the time when the accumulated neutron fluence of the capsule corresponds to the approximate EOL fluence at the reactor vessel inner wall location, whichever comes first. Since capsule X was withdrawn at approximately 15.5 EFPY, capsule X is considered to have met the requirements of ASTM E 185 for the fourth capsule.

Fifth Capsule - Table 1 of ASTM E 185 requires that the fifth capsule be withdrawn at approximately EOL and at the time when the accumulated neutron fluence of the capsule corresponds to not less than once and not more than twice the peak EOL vessel fluence. Since capsule U will be withdrawn at approximately 37 EFPY when the accumulated fluence is expected to be approximately 1.86×10^{19} n/cm^2 and the EOL (i.e. approximately 48 EFPY) peak vessel fluence is estimated to be approximately 1.56×10^{19} n/cm^2, capsule U is considered to meet the requirements of ASTM E 185 for the fifth capsule (i.e. fluence between 1.56×10^{19} n/cm^2 and 3.12×10^{19} n/cm^2).

Based on the above discussion it is concluded that the surveillance capsule withdrawal schedule proposed above meets the requirements of ASTM E 185-82 for an operating period of up to 60 years or 48 EFPY.

4.0 REFERENCES

1. 10 CFR 50, Appendix H, "Reactor Vessel Material Surveillance Program Requirements."

2. 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.

3. ASTM Standard E185-82, "Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels".

4. WCAP-16251-NP, Revision 0, "Analysis of Capsule X from Entergy's Indian Point Unit 3 Reactor Vessel Radiation Surveillance Program", dated July 2004.

5. Entergy Letter NL-08-014, "Clarifications to reactor vessel surveillance program and neutron embrittlement time-limited aging analyses and audit item #105; and revision to license renewal regulatory commitment list", dated January 17, 2008.