August 14, 2007

Mr. Michael Balduzzi
Sr. Vice President, Regional Operations NE
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601

SUBJECT: PALISADES NUCLEAR PLANT - APPROVAL OF PROPOSED REACTOR VESSEL SURVEILLANCE CAPSULE WITHDRAWAL SCHEDULE (TAC NO. MD3461)

Dear Mr. Balduzzi:

By letter dated September 19, 2006, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML0626300710), and supplemented by letter dated, January 30, 2007, (ADAMS Accession No. ML070300405), Nuclear Management Company, LLC (NMC, the licensee, at the time of submittal), submitted a proposed change to reactor vessel material surveillance capsule withdrawal schedule pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Appendix H. The proposed schedule was developed to accommodate the 60-year licensing period for Palisades Nuclear Plant (PNP) using the guidance of American Society for Testing and Materials (ASTM) Standard Practice E-185-82, "Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels." Entergy Nuclear Operations, Inc (ENO), has since become the current licensee, following a license transfer that occurred on
April 11, 2007.

Our review is contained in the enclosed safety evaluation. The Nuclear Regulatory Commission staff found that the proposed surveillance capsule withdrawal schedule for PNP is in accordance with Appendix H to 10 CFR Part 50, and the recommendations of ASTM Standard Practice E-185-82.

Sincerely,

/RA/

Travis L. Tate, Acting Chief
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-255

Enclosure:
Safety Evaluation

cc w/encl: See next page

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ADAMS Accession Number: ML071640310 * Safety Evaluation dated: March 6, 2007

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Palisades Plant

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SURVEILLANCE CAPSULE WITHDRAWAL SCHEDULE

PALISADES NUCLEAR PLANT

NUCLEAR MANAGEMENT COMPANY

DOCKET NO. 50-255

1.0 INTRODUCTION

By letter dated September 19, 2006, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML0626300710), and supplemented by letter dated, January 30, 2007, (ADAMS Accession No. ML070300405) pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Appendix H, "Reactor Vessel Material Surveillance Program Requirements," Nuclear Management Company (NMC, the licensee, at the time of submittal), submitted a proposed reactor pressure vessel (RPV) material surveillance capsule withdrawal schedule for Nuclear Regulatory Commission (NRC) staff review and approval. The proposed schedule was developed to accommodate the 60-year licensing period for Palisades Nuclear Plant (PNP) using the guidance of American Society for Testing and Materials (ASTM) Standard Practice E-185-82, "Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels." Entergy Nuclear Operations, Inc (ENO), has since become the current licensee, following a license transfer that occurred on April 11, 2007.

2.0 REGULATORY REQUIREMENTS

The surveillance program requirements in Appendix H to 10 CFR Part 50, were established to monitor the radiation-induced changes in the mechanical and impact properties of the RPV materials. Appendix H to 10 CFR Part 50 requires licensees to monitor changes in the fracture toughness properties of ferritic materials in the RPV beltline region of light-water nuclear power reactors. Appendix H to 10 CFR Part 50 states that the design of the surveillance program and the withdrawal schedule must meet the requirements of the edition of ASTM E-185 that is 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. Later editions of ASTM E-185 may be used including those editions through 1982 (i.e., ASTM E-185-82). NUREG-1801, Generic Aging Lessons Learned Report provides additional guidance for the surveillance program for the 60-year extended period of operation.

3.0 TECHNICAL EVALUATION

3.1 Evaluation Criteria of ASTM E-185-82

PNP is using the requirements of ASTM E-185-82 as its basis for meeting the RPV surveillance capsule withdrawal requirements of Appendix H to 10 CFR Part 50. Table 1 of ASTM E-185-82 requires that either a minimum of three, four, or five surveillance capsules be removed from each of the vessels, as based on the projected nilductility reference temperature shift (ΔRT_{NDT}) of the limiting material at the clad-vessel interface location of the RPV at the end-of-licensed plant life (EOL). ASTM E-185-82 establishes the following criteria for determining the minimum number of capsules that are to be removed in accordance with a withdrawal schedule and the number of capsules that are to be tested:

> For plants with projected ΔRT_{NDT} less than 100 °F (56 °C), three capsules are required to be removed from the RPV and the first two capsules are required to be tested (for dosimetry, tensile-ductility, Charpy-V impact toughness, and alloying chemistry).
>
> For plants with projected ΔRT_{NDT} between 100 °F (56 °C) and 200 °F (111 °C), four surveillance capsules are to be removed from the RPV and the first three capsules are required to be tested.
>
> For plants with projected ΔRT_{NDT} above 200 °F (111 °C), five surveillance capsules are required to be removed from the RPV and the first four capsules are required to be tested.

For any of these withdrawal schedules, ASTM E-185-82 specifies that the final surveillance capsule should be withdrawn after accumulating a neutron fluence (E > 1.0 MeV) of between one and two times the peak, EOL RPV fluence.

PNP has a limiting ΔRT_{NDT} value greater than 200 °F. Therefore, because the ΔRT_{NDT} value is greater than 200 °F, ASTM E 185-82 recommends that, at a minimum, five capsules to be withdrawn. PNP has removed and tested four capsules and has proposed a change in a withdrawal schedule for the fifth capsule.

3.2 Changes Proposed to the Withdrawal Schedule for PNP

In accordance with ASTM E-185-82, Table 1, the recommended withdrawal schedule for the fifth capsule, W-80, is such that the surveillance capsule fluence is not less than once or greater than twice the peak EOL vessel fluence. EOL for PNP is equivalent to 42.37 Effective Full Power Years (EFPYs) of operation based on the renewed license.

The following table summarizes PNP capsules which have already been removed and the proposed withdrawal of remaining capsules. The fifth capsule is proposed to be removed and tested between the 40th and 60th year of plant operation. Capsules W-280 and W-260 both remain available for subsequent removal and testing, if needed.

The projected peak vessel fluence at 60 years (42.37 EFPY) is estimated to be $2.998X10^{19}$ neutrons per square centimeter (n/cm^2). The licensee projects a capsule fluence of $3.06X10^{19}$ (n/cm^2) at 31.96 EFPY. Thus, capsule W-80 will capture the 60th year peak vessel fluence at 31.96 EFPY. Capsules W-280 and W-260 are reserved and will be withdrawn and tested in the future, if necessary.

Withdrawal Sequence	Capsule (Unit shown as subscript)	Removal Time	Capsule Fluence X 10^{19} (n/cm^2)
First	A-240	2.26 EFPY	4.01
Second	W-290	5.21 EFPY	0.926
Third	W-110	9.95 EFPY	1.66
Fourth	W-100	16.93 EFPY	2.1
Fifth	W-80	~ 31.96 EFPY	~ 3.06
	W-280	Reserved for future use	
	W-260	Reserved for future use	
	T-150	Reserved for future use	

4.0 CONCLUSION

Based on the NRC staff's review of the NMC submittal, the revised surveillance capsule withdrawal schedule for the PNP RPV satisfies the requirements of ASTM E-185-82. Therefore, the NRC staff concludes that the licensee's modified surveillance capsule withdrawal schedule for PNP, as provided in the September 19, 2006, submittal and supplemental letter dated January 30, 2007, is acceptable for implementation and satisfies the requirements of Appendix H to 10 CFR Part 50 for the 60-year extended license period.

Principal Contributors: Neil K. Ray

Date: