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JAFP-06-0016

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

SUBJECT: Entergy Nuclear Operations, Inc.
James A. FitzPatrick Nuclear Power Plant
Docket No. 50-333
License No. DPR-59

**Proposed License Amendment: Changes to the Reactor Vessel Material Surveillance Program**

REFERENCES:

1. NRC letter from W. H. Bateman to C. Terry (BWRVIP Chairman), NRC Staff Review of BWRVIP-86-A, "BWR Vessel Internal Project, Updated BWR Integrated Surveillance Program (ISP) Implementation Plan," dated December 16, 2002.

2. Regulatory Issue Summary No. 2002-05, "NRC Approval of Boiling Water Reactor Pressure Vessel Integrated Surveillance Program," dated April 8, 2002.

Dear Sir:

Pursuant to 10 CFR 50.90, Entergy Nuclear Operations, Inc. (ENO) hereby proposes to amend the James A. FitzPatrick Nuclear Power Plant (JAFNPP) Operating License, DPR-59.

The proposed license amendment replaces the existing Reactor Vessel Material Surveillance Program with the Boiling Water Reactor Vessel and Internals Project (BWRVIP) Integrated Surveillance Program (ISP), as approved by the NRC (References 1 and 2). This proposed amendment meets ENO's commitment to describe JAFNPP's participation in the BWRVIP ISP and Supplemental Surveillance Program (SSP).

The enclosure and attachments provide ENO's evaluation of the proposed change, and provide Updated FSAR and TS Bases pages.

ENO has reviewed the proposed amendment in accordance with 10 CFR 50.92 and concludes that this amendment does not involve a significant hazards consideration.

Once approved, the amendment will be implemented within 60 days.

In accordance with 10 CFR 50.91, a copy of this application, with the associated enclosure and attachments, is being provided to the designated New York State official.

If you have any questions or require additional information, please contact Mr. Jim Costedio at (315) 349-6358.

AP01

I declare under penalty of perjury that the foregoing is true and correct.

Executed on the 26th day of January, 2006.

Sincerely,

T. A. Sullivan
Site Vice President

TAS:RP:dmr

Enclosure: Evaluation of Proposed License Amendment (4 pages)
Attachment 1: Proposed JAFNPP Updated FSAR Change (1 page)
Attachment 2: List of Regulatory Commitments (1 page)
Attachment 3: Proposed Markup of TS Bases Pages (2 pages)

cc:

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**ENCLOSURE**

**EVALUATION OF PROPOSED LICENSE AMENDMENT**

Subject: Proposed Changes to the Reactor Vessel Material Surveillance Program.

1. Description

Entergy proposes to revise the licensing basis for the James A. FitzPatrick Nuclear Power Plant (JAFNPP) by replacing the current plant-specific reactor pressure vessel (RPV) material surveillance program with the Boiling Water Reactor (BWR) Integrated Surveillance Program (ISP), which was approved by the NRC in its Safety Evaluation (SE) dated February 1, 2002 (Reference 1).

2. Proposed Change

- Licensing Basis Change: A new section 4.2.7, describing the Reactor Vessel Materials Surveillance Program (Attachment 1), will be inserted into JAFNPP's Updated Final Safety Analysis Report (UFSAR). This section will provide a description of JAFNPP's participation in the BWR Vessel and Internals Project (BWRVIP) Integrated Surveillance Program for compliance with 10 CFR 50, Appendices G and H, replacing the program previously specified in section 4.2.7. Attachment 3 provides a markup of the update to the TS Bases.

Attachment 2 provides commitments made in this submittal. The proposed change to the UFSAR and TS Bases will be implemented following NRC approval of this request. The TS Bases pages are provided for information only and will be controlled and updated in accordance with TS 5.5.11, "Technical Specifications (TS) Bases Control Program."

3. Background

Appendix H of 10 CFR 50, "Reactor Vessel Material Surveillance Program Requirements," requires a surveillance program to monitor a reactor pressure vessel beltline region that complies with American Society for Testing & Materials (ASTM) E-185, except as modified by Appendix H. ASTM E-185 provides guidelines for designing a surveillance program, selecting materials, evaluating test results, and recommendations for the minimum number of surveillance capsules and their withdrawal schedules. 10 CFR 50, Appendix H requires that the proposed withdrawal schedule be submitted with a technical justification and approved prior to implementation.

The existing JAFNPP reactor vessel material surveillance program withdrawal schedule was determined using the guidance of ASTM E-185-82 which is incorporated by reference in 10 CFR 50 Appendix H Paragraph III.B.

Over the last several years, BWRVIP developed an ISP to replace the individual plant programs and submitted it for NRC approval. The NRC staff completed its review of the BWRVIP ISP (References 1 and 2) and found it acceptable for BWR licensee implementation provided that all licensees use one or more neutron fluence methodologies acceptable to the NRC staff to determine surveillance capsule and RPV neutron fluences. The staff also required licensees who elect to participate in the ISP to submit a license amendment to the NRC confirming their incorporation of the ISP into the licensing basis for each BWR facility.

JAFNPP is participating in the BWRVIP Integrated Surveillance/Supplemental Surveillance programs. These programs will provide fracture toughness data to support adjustments to the Pressure-Temperature (P-T) curves for vessel heat-up and cool-down applications. JAFNPP intends to perform new neutron transport calculations using R.G. 1.190 approved methodology.

## 4. Technical Analysis

### 4.1 Regulatory Requirement

10 CFR 50, Appendix H, "Reactor Vessel Material Surveillance Program Requirements," requires Entergy to monitor changes to the fracture toughness properties of ferritic materials in the JAFNPP reactor vessel beltline region which result from exposure of these materials to neutron irradiation and the thermal environment. Under the program, fracture toughness test data will be obtained from material specimens exposed in surveillance capsules, which will be withdrawn periodically from the reactor vessel.

### 4.2 BWRVIP ISP/SSP and JAFNPP Reactor Vessel Material Program

JAFNPP had three surveillance capsules located circumferentially along the reactor vessel inside radius and axially at the reactor vessel core mid-plane. The first capsule was withdrawn at 5.98 Effective Full Power Years (EFPY) of operation (References 5 and 6). This first capsule was reconstituted as a supplemental capsule and subsequently re-inserted in the reactor vessel during the next refueling outage (Reference 7). The second capsule was withdrawn at 13.4 EFPY of operation (References 8 and 9) and subsequently analyzed for both fluence and fracture toughness. The data was used to determine adjustments to the reactor vessel P-T limits.

JAFNPP is a participant in the BWRVIP ISP/SSP program. BWRVIP ISP/SSP is an alternative to individual plant-specific RPV surveillance program within the scope of paragraph III.C of Appendix H of 10 CFR 50. The NRC has approved BWRVIP ISP/SSP (References 1 and 2) for plant-specific use. Under the NRC approved program, the two remaining JAFNPP capsules in the JAFNPP vessel are deferred and representative specimens from host plants are selected to provide the required data for compliance with Appendix G and H requirements. The JAFNPP representative samples and withdrawal schedules are described in BWRVIP-86-A, "BWR Vessel and Internals Project, Updated BWR Integrated Surveillance Program (ISP) Implementation Plan," (Reference 4). JAFNPP will continue to participate in the BWRVIP ISP/SSP program to demonstrate fracture toughness requirements and P-T limits to comply with Appendices G and H of 10 CFR 50. JAFNPP will provide fluence calculations and P-T curves based upon the NRC approved methodology prescribed in R.G. 1.190, R.G. 1.99, Rev. 2, and fracture toughness data obtained from the BWRVIP ISP/SSP.

Based on the Entergy participation in the NRC approved BWRVIP ISP/SSP for compliance with Appendices G and H of 10 CFR 50, JAFNPP will be revising the licensing basis describing the BWRVIP ISP/SSP in the UFSAR.

5. Regulatory Safety Analysis

5.1 No Significant Hazards Consideration

The proposed license amendment revises JAFNPP's licensing basis incorporating the NRC approved BWRVIP ISP into the Updated Final Safety Analysis Report (UFSAR) to comply with Appendix H of 10 CFR 50.

Entergy has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR50.92, "Issuance of Amendment," as discussed below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No.

   The proposed change to the licensing basis continues to assure that applicable regulatory requirements are met and the same assurance of reactor pressure vessel integrity continues to be provided. The proposed change to the License and licensing basis follow the NRC Safety Evaluation approving the implementation of the ISP. The proposed change ensures that the reactor pressure vessel will continue to be operated within the design, operational, and testing limits.

   The proposed change does not modify the reactor coolant pressure boundary, (i.e., there are no changes in operating pressure, materials, or seismic loading). The proposed change does not adversely affect the integrity of the reactor coolant pressure boundary such that its function in the control of radiological consequences is affected.

   Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No

   The proposed change does not involve a modification to the design of plant structures, systems, or components. Thus, no new modes of operation are introduced by the proposed change. The proposed change will not create any failure mode not bounded by previously evaluated accidents. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

   Response: No.

   The proposed implementation of ISP has been previously approved by the NRC and found to provide an acceptable alternative to plant-specific reactor vessel material surveillance programs. Operation of JAFNPP within the program ensures that the reactor vessel materials will continue to behave in a non-brittle manner, thereby preserving the original safety design bases. Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, Entergy concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

Based on the considerations discussed above, Entergy concludes that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

## 6.0 Environmental Consideration

The amendment changes a requirement with respect to use of a facility component located within the restricted area as defined in 10 CFR Part 20. JAFNPP has determined that the amendment involves no significant increases in the amounts, and no significant change in the types, of any effluents that may be released offsite, and there is no significant increase in individual or cumulative occupational radiation exposure. JAFNPP also finds that the proposed amendment involves no significant hazards consideration. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Hence, pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

## 7.0 References


1. W. H. Bateman (USNRC) to C. Terry, Safety Evaluation Regarding EPRI Proprietary Reports "BWR Vessel and Internals Project, BWR Integrated Surveillance Program Plan (BWRVIP-78)" and "BWRVIP-86: BWR Vessel and Internals Project, BWR Integrated Surveillance Program Implementation Plan," dated February 1, 2002.

2. NRC letter from W. H. Bateman to C. Terry (BWRVIP Chairman), NRC Staff Review of BWRVIP-86-A, "BWR Vessel Internal Project, Updated BWR Integrated Surveillance Program (ISP) Implementation Plan," dated December 16, 2002.

3. Regulatory Issue Summary No. 2002-05, "NRC Approval of Boiling Water Reactor Pressure Vessel Integrated Surveillance Program," dated April 8, 2002.

4. BWRVIP-86-A, "BWR Vessel and Internals Project, Updated BWR Integrated Surveillance Program (ISP) Implementation Plan," Final Report, dated October 2002.

5. NYPA letter, JPN-86-22, from J.C. Brons to NRC, "Reactor Vessel Surveillance Materials Program Summary Report and Implementation Schedule," dated April 30, 1986.

6. GE Report MDE-49-0386, DRF-B11-00339, Class I, "JAFNPP Reactor Vessel Surveillance Materials Testing and Fracture Toughness Analysis," dated April 1986.

7. GE Report SASR 87-58, DRF B11-00339, "Preparation of Surveillance Capsule Holder with Reconstituted Irradiated Materials for the JAFNPP," dated October 1987.

8. NYPA letter, JPN-97-035, from R.J. Deasy to NRC, "Reactor Vessel Surveillance Materials Program Summary Report and Implementation Schedule," dated November 10, 1997.

9. GE Report GE-NE-B1100732-1, Revision 1, Class II, "Plant Fitzpatrick RPV Surveillance Materials Testing and Analysis of 120 degree capsule at 13.4 EFPY," dated February 1998.

ATTACHMENT 1

**PROPOSED JAFNPP UPDATED FSAR CHANGE**

(One page)

The reactor vessel and Reactor Coolant System were hydrostatically tested in accordance with code requirements at 125 percent design pressure. Vessel temperature is maintained at a minimum of the temperature shown in Figure 16.5-1. In accordance with the ISI program, hydrostatic or leakage testing follows each removal and replacement of the reactor vessel head. Other preoperational tests included the calibration and testing of reactor vessel flange, seal ring leakage detection and instrumentation, the adjustment of reactor vessel stabilizers, a check of all vessel thermocouples, and an operational check of the vessel flange stud tensioner.

### 4.2.7 Inspection and Testing

Accessibility for inservice inspection was considered during the design of the reactor vessel and insulation to ensure adequate working space and access for inspection. The selection of the components and locations to be inspected meet the intent of the ASME Boiler and Pressure Vessel Code, Section XI, "Inservice Inspection of Nuclear Reactor Coolant Systems", dated January 1, 1970. The details of the Inservice Inspection Program for JAF plant are specified in Section 16.4.

The ORIGINAL material surveillance test program for the reactor vessel provides for the preparation of a series of Charpy V-Notch impact specimens and tensile specimens from the base metal of the reactor vessel, weld heat affected zone metal, and weld metal from a reactor steel joint which simulates a welded joint in the reactor vessel. The specimens (two capsules with 12 impact specimens each) and neutron monitor wires (iron, nickel and copper) were placed near core mid-height, adjacent to the reactor vessel wall where neutron exposure is similar to that of the vessel wall. The specimens were installed at startup or just prior to full-power operation. Selected groups of specimens are removed at intervals over the lifetime of the reactor and tested to compare mechanical properties with the properties of control specimens which are not irradiated. The material surveillance test program is ~~currently~~ based on 10 CFR 50 Appendix H. ~~The schedule for withdrawal of capsules is determined using the guidance of ASTM E-185-82 which is incorporated by reference in 10 CFR 50 Appendix H Paragraph III.B.~~ The first capsule was removed at 5.98 effective full power years (EFPY) of operation and the second capsule was removed at 13.4 EFPY of operation. ~~The next surveillance capsule will be removed after approximately 30 EFPY of operation based upon expected neutron fluence of the capsule. The NRC staff verified that this surveillance capsule withdrawal schedule satisfies the ASTM E185-70 standard, and that the withdrawal of the third surveillance capsule will also be in accordance with ASTM E185-82.~~ (INSERT 1)

No weak direction specimens were included in the reactor vessel material surveillance program. All Charpy V-Notch specimens were taken parallel to the direction of rolling. The majority of development work on radiation effects has been with longitudinal specimens. This is considered the best specimen to be used for determination of changes in transition temperature.

At the low neutron fluence levels of plants no change in transverse shelf level is expected and transition temperature changes are minimal.

NRC Regulatory Guide 1.99, "Radiation Embrittlement of Reactor Vessel Materials", Revision 2, May 1988, provides the basis for the reactor vessel material surveillance analysis which accounts for irradiation embrittlement effects in the reactor vessel core region, or beltline. The best estimate fluence for the peak locations in the lower shell and the lower intermediate shell after 32 effective full power years (EFPY) or 40 years of power operation at 80% capacity factor are expected to be $1.61 \times 10^{18}$ n/cm$^2$ and $1.81 \times 10^{18}$ n/cm$^2$ respectively at the vessel ID.

**INSERT 1**

An Integrated Surveillance Program (ISP) has been established by the BWRVIP to replace individual plant vessel surveillance programs as documented in BWRVIP-86-A, "BWR Vessel and Internals Project, Updated BWR Integrated Surveillance Program (ISP) Implementation Plan," Final Report, October 2002. The ISP matches the vessel chemistry of an individual plant to a representative plant and the capsule results, (i.e., changes in fracture toughness with neutron exposure, from the representative plant will be applied at the individual plant). The NRC approved the BWRVIP program in an SER, dated February 1, 2002, and determined the approved ISP adequately addresses the requirements of 10 CFR 50, Appendix H. A condition of the NRC SER requires that individual plant vessel fluence calculations be performed using methods in accordance with the recommendations of Regulatory Guide 1.190. The capsule withdrawal schedule at the representative plant is controlled by the BWRVIP. JAF is a member of the BWRVIP and will replace its individual plant surveillance program with the ISP. The balance of the JAF specimen capsules will remain in place to serve as backup for the BWRVIP program, or as otherwise needed.

ATTACHMENT 2

## LIST OF REGULATORY COMMITMENTS

The following table identifies those actions committed to by JAF in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments. Please direct questions regarding these commitments to Mr. Jim Costedio at (315) 349-6358.

| REGULATORY COMMITMENTS | DUE DATE |
|---|---|
| | |
| Revise JAFNPP UFSAR and TS Bases, describing BWRVIP ISP/SSP program | 60 days of issue |

ATTACHMENT 3

**PROPOSED MARKUP OF TS BASES PAGES**

(Two pages)

and the BWRVIP ISP (Ref. 13)

BASES

BACKGROUND (continued)

with ASTM E 185 (Ref. 3) and Appendix H of 10 CFR 50 (Ref. 4). The operating P/T limit curves are adjusted, as necessary, based on the evaluation findings and the recommendations of Reference 5.

The P/T limit curves are composite curves established by superimposing limits derived from stress analyses of those portions of the reactor vessel and head that are the most restrictive. At any specific pressure, temperature, and temperature rate of change, one location within the reactor vessel will dictate the most restrictive limit. Across the span of the P/T limit curves, different locations are more restrictive, and, thus, the curves are composites of the most restrictive locations.

The heatup curve represents a different set of restrictions than the cooldown curve because the directions of the thermal gradients through the vessel wall are reversed. The thermal gradient reversal alters the location of the tensile stress between the outer and inner walls. However, the P/T limit curves reflect the most restrictive of the heatup and cooldown curves.

The P/T criticality limits include the Reference 1 requirement that they be at least 40°F above the heatup curve or the cooldown curve and not lower than the minimum permissible temperature for the inservice leakage and hydrostatic testing.

The consequence of violating the LCO limits is that the RCS has been operated under conditions that can result in brittle failure of the RCPB, possibly leading to a nonisolable leak or loss of coolant accident. In the event these limits are exceeded, an evaluation must be performed to determine the effect on the structural integrity of the RCPB components. ASME Code, Section XI, Appendix E (Ref. 6), provides a recommended methodology for evaluating an operating event that causes an excursion outside the limits.

APPLICABLE SAFETY ANALYSES

The P/T limits are not derived from Design Basis Accident (DBA) analyses. They are prescribed during normal operation to avoid encountering pressure, temperature, and temperature rate of change conditions that might cause undetected flaws to propagate and cause nonductile failure of the RCPB, a condition that is unanalyzed. Reference 7 establishes the methodology for determining the P/T limits. Reference 8

(continued)

BASES

REFERENCES (continued)

7. GE-NE-B1100732-01, Revision 1, Plant FitzPatrick RPV Surveillance Materials Testing and Analysis of 120° Capsule at 13.4 EFPY, February 1998, including Errata and Addenda Sheets dated June 17, 1999 and December 3, 1999.

8. Letter from Guy Vissing (NRC) to James Knubel (NYPA) Issuance of Amendment No. 258 to James A. FitzPatrick Nuclear Power Plant, November 29, 1999.

9. 10 CFR 50.36(c)(2)(ii).

10. UFSAR, Section 14.5.7.2.

11. GE-NE-208-04-1292, Evaluation of Idle Recirculation Loop Restart Without Vessel Bottom Temperature Indication for FitzPatrick Nuclear Power Plant, December 1992.

12. JAF-RPT-RWR-02076, Verification of Alternative Operating Conditions for Idle Recirculation Loop Restart Without Vessel Bottom Temperature Indication, June 25, 1995.

13. UFSAR, Section 4.2.7.