

October 4, 2007

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

SUBJECT: INDIAN POINT NUCLEAR GENERATING UNIT NO. 3 - ISSUANCE OF
AMENDMENT RE: TECHNICAL SPECIFICATION CHANGE REQUEST FOR
PRESSURE-TEMPERATURE AND LOW TEMPERATURE PROTECTION
SYSTEM LIMITS (TAC NO. MD4079)

Dear Mr. Balduzzi:

The Commission has issued the enclosed Amendment No. 235 to Facility Operating License No. DPR-64 for the Indian Point Nuclear Generating Unit No. 3. The amendment consists of changes to the Technical Specifications (TS) in response to your application dated January 18, 2007.

The amendment (1) revises the expiration time of the pressure-temperature limit curves from 20 effective full-power years (EFPYs) of operation to 27.2 EFPYs, (2) revises the adjusted reference temperature to reflect the revised expiration limit, and (3) revises the low temperature overpressure protection system arming temperature from 319 °F to 330 °F .

A copy of the related Safety Evaluation is enclosed. A Notice of Issuance will be included in the Commission's next regular biweekly *Federal Register* notice.

Sincerely,

/RA/

John P. Boska, Senior Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-286

Enclosures:

1. Amendment No. 235 to DPR-64
2. Safety Evaluation

cc w/encls: See next page

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Accession Number: ML072470162

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DATE	9/12/07	9/17/07	9/24/07	10/02/07	10/03/07

Official Record Copy

DATED: October 4, 2007

AMENDMENT NO. 235 TO FACILITY OPERATING LICENSE NO. DPR-64 INDIAN POINT
UNIT 3

PUBLIC

LPL1-1 R/F

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RidsNrrLASLittle (hard copy)

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RidsNrrDirsltsb

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ENERGY NUCLEAR INDIAN POINT 3, LLC

ENERGY NUCLEAR OPERATIONS, INC.

DOCKET NO. 50-286

INDIAN POINT NUCLEAR GENERATING UNIT NO. 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 235
License No. DPR-64

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Entergy Nuclear Operations, Inc. (the licensee) dated January 18, 2007, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-64 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 235, are hereby incorporated in the license. ENO shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 30 days.

FOR THE NUCLEAR REGULATORY COMMISSION

Mark G. Kowal, Chief
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the License and
Technical Specifications

Date of Issuance: October 4, 2007

ATTACHMENT TO LICENSE AMENDMENT NO. 235

FACILITY OPERATING LICENSE NO. DPR-64

DOCKET NO. 50-286

Replace the following page of the License with the attached revised page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

Remove Page

3

Insert Page

3

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove Pages

3.4.3-3
3.4.3-4
3.4.3-5
3.4.7-1
3.4.10-1
3.4.12-1
3.4.12-3
3.4.12-4
3.4.12-6
3.4.12-7
3.4.12-8
3.4.12-9
3.4.12-10
3.4.12-11
3.4.12-12

Insert Pages

3.4.3-3
3.4.3-4
3.4.3-5
3.4.7-1
3.4.10-1
3.4.12-1
3.4.12-3
3.4.12-4
3.4.12-6
3.4.12-7
3.4.12-8
3.4.12-9
3.4.12-10
3.4.12-11
3.4.12-12

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 235 TO FACILITY OPERATING LICENSE NO. DPR-64
ENTERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NO. 3

DOCKET NO. 50-286

1.0 INTRODUCTION

By letter dated January 18, 2007, Agencywide Documents Access and Management System (ADAMS) Accession No. ML070240285, Entergy Nuclear Operations, Inc. (the licensee) submitted a request for changes to the Indian Point Nuclear Generating Unit No. 3 (IP3) Technical Specifications (TS). The proposed changes would (1) revise the expiration time of the pressure-temperature (PT) limit curves from 20 effective full-power years (EFPYs) of operation to 27.2 EFPYs, (2) revise the adjusted reference temperature (ART) to reflect the revised expiration limit, and (3) revise the low temperature overpressure protection (LTOP) system arming temperature from 319 °F to 330 °F (Reference 1).

The analysis of record for the vessel fluence and the corresponding PT limit curves have been previously reviewed and approved by the NRC staff in License Amendment Nos. 220 (Reference 4) and 225 (Reference 5) for values up to 34.0 EFPYs. The current TS curves are valid to 20 EFPYs which corresponds to an LTOP arming temperature of 319 °F. The licensee established the 20 EFPY limit in the TS previously so that modifications to the LTOP arming temperature would not be required. However, due to the continued vessel fluence increase it is now necessary to update the TS curves. The requested applicability limit of 27.2 EFPYs corresponds to an LTOP arming temperature of 330 °F. In addition, Entergy is proposing to make several editorial changes to the IP3 TS.

2.0 REGULATORY EVALUATION

The regulatory requirements for which the NRC staff based its acceptance are:

- a. Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.60, "Acceptance criteria for fracture prevention measures for lightwater nuclear power reactors for normal operation," which requires compliance with 10 CFR Part 50 Appendix G, "Fracture Toughness Requirements."
- b. 10 CFR 50.61, "Fracture toughness requirements for prevention against pressurized thermal shock events";

- c. Generic Letter (GL) 88-11, "NRC Position on Radiation Embrittlement Of Reactor Vessel Materials And Its Impact On Plant Operations," dated July 12, 1988;
- d. GL 92-01, Revision 1, "Reactor Vessel Structural Integrity," dated March 6, 1992, and Supplement 1 dated May 19, 1995;
- e. Regulatory Guide (RG) 1.99, Revision 2, "Radiation Embrittlement of Reactor Vessel Materials," May 1988;
- f. RG 1.190, "Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence," March 2001;
- g. Standard Review Plan (SRP) Section 5.3.2, "Pressure-Temperature Limits."

Appendix G to 10 CFR Part 50 requires that PT limit curves for the reactor pressure vessel (RPV) be at least as conservative as those obtained by applying the methodology of Appendix G to Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code). The licensee has currently incorporated the 1989 Edition of the ASME Code into the IP3 licensing basis for defining the ASME Code requirements which apply to the facility's ASME Code, Section XI program, except for repair and replacement activities which are governed by the 2001 Edition through the 2003 Addenda. Hence, with respect to the requirements of Appendix G to 10 CFR Part 50, it is the 1989 Edition of Appendix G to Section XI of the ASME Code which currently applies to the PT limits in the IP3 TSs.

The Nuclear Regulatory Commission (NRC) staff has approved RPV fluence calculation methodologies which satisfy the requirements of 10 CFR Part 50 Appendix A, General Design Criteria (GDC) 14, "Reactor coolant pressure boundary," GDC 30, "Quality of reactor coolant pressure boundary," and GDC 31, "Fracture prevention of reactor coolant pressure boundary," and adhere to the guidance in RG 1.190. In this regard, the staff's position is that fluence calculations are acceptable if they are done with approved methodologies or with methods which are shown to conform to the guidance in RG 1.190.

SRP Section 5.3.2 provides an acceptable method of determining the PT limit curves for ferritic materials in the beltline of the RPV based on the linear elastic fracture mechanics (LEFM) methodology of Appendix G to Section XI of the ASME Code. The basic parameter of this methodology is the stress intensity factor, K_I , which is a function of the stress state and flaw configuration. Appendix G to Section XI of the ASME Code requires a safety factor of 2.0 on stress intensities resulting from reactor pressure during normal and transient operating conditions, and a safety factor of 1.5 on stress intensities resulting from hydrostatic testing. Appendix G to Section XI of the ASME Code also requires a safety factor of 1.0 on stress intensities resulting from thermal loads for normal and transient operating conditions as well as for hydrostatic testing. The methods of Appendix G postulate the existence of a sharp surface flaw in the RPV that is normal to the direction of the maximum stress (i.e., of axial orientation). This flaw is postulated to have a depth that is equal to 1/4 of the RPV beltline thickness and a length equal to six times its depth. The critical locations in the RPV beltline region for calculating heatup and cooldown PT limit curves are the 1/4 thickness (1/4T) and 3/4 thickness (3/4T) locations, which correspond to the maximum depth of the postulated inside surface and outside surface defects, respectively. The methodology found in Appendix G to Section XI of the ASME Code requires that licensees determine the ART or adjusted RT_{NDT} at the 1/4T and

3/4T locations. The ART is defined as the sum of the initial (unirradiated) reference temperature (initial RT_{NDT}), the mean value of the adjustment in reference temperature caused by irradiation (ΔRT_{NDT}), and a margin term.

Guidance on the determination of ΔRT_{NDT} and the margin term is given in RG 1.99, Revision 2. ΔRT_{NDT} is a product of a chemistry factor (CF) and a fluence factor. The CF is dependent upon the amount of copper and nickel in the material and may be determined from tables in RG 1.99, Revision 2, or from surveillance data. The fluence factor is dependent upon the neutron fluence at the maximum postulated flaw depth. The margin term is dependent upon whether the initial RT_{NDT} is a plant-specific or a generic value and whether the CF was determined using the tables in RG 1.99, Revision 2, or surveillance data. The margin term is used to account for uncertainties in the values of the initial RT_{NDT} , the copper and nickel contents, the fluence, and the calculational procedures.

10 CFR 50.61 establishes the applicability of RT_{PTS} screening criterion. The relationship between the LTOP enable temperature and the PT period of validity is a function of the material properties at the end of the proposed period of applicability.

3.0 TECHNICAL EVALUATION

3.1 Fluence Calculational Methodology

The NRC staff review for the issuance of IP3 License Amendment Nos. 220 and 225 (References 4 and 5) reviewed the vessel fluence calculations and found them acceptable, i.e., satisfying guidance in RG 1.190, for fluence levels up to 34.0 EFPYs. That value is not a subject for this review because it has not changed. The proposed extension to 27.2 EFPYs is bounded by the approved vessel fluence value of 34.0 EFPYs, therefore, it is acceptable.

3.2 TS PT Limit Curves and ART

The licensee is proposing to change the current TS PT limit curve applicability from 20.0 to 27.2 EFPYs. The change is required because the current applicability limit is estimated to be reached by December 2007. The reason for the staged PT limit and LTOP limit setting is the licensee's previous effort to avoid modifying the LTOP arming temperature by restricting the TS PT limit curve to the 20 EFPY level. The PT limits and the LTOP arming temperature have corresponding values, i.e., if the PT limit curves change the arming temperature should change appropriately. The proposed extension to 27.2 EFPYs is bounded by the approved vessel fluence value of 34.0 EFPYs, therefore, it is acceptable. The ART values for 27.2 EFPYs at the 1/4T and 3/4T locations are being revised to 241.1 °F and 198.1 °F, respectively. The ART values were also part of the licensee's submittal for License Amendment No. 220 (Reference 6) which were previously reviewed and approved by the NRC and are, therefore, acceptable.

3.3 Editorial Changes to the TS

The licensee identified that several places in TS 3.4.12 associated with comparisons between the reactor coolant system temperature and the LTOP arming temperature do not match the standard TS in the use of the symbols for "less than," "less than or equal to," "greater than," and "greater than or equal to." These are being revised to match the Standard TS, NUREG-

1431. The changes will add clarity to the TSs and match the standard TS, and do not alter the meaning of the IP3 specifications, therefore, they are acceptable.

3.4 Vessel Heatup, Cooldown, and Hydrostatic Testing Curves

TS Figures 3.4.3-1, 3.4.3.2, and 3.4.3-3, regarding vessel heatup, cooldown and hydrostatic testing respectively, changed the period of applicability from 20.0 to 27.2 EFPYs. As stated above, these changes are acceptable because the proposed applicability range of 27.2 EFPYs is bounded by the approved value of 34.0 EFPYs.

3.5 LTOP Arming Temperature

The LTOP arming temperature is that temperature at which the LTOP system must be in service, with the lift setpoint of the pressurizer power-operated relief valves reduced to avoid overpressure of the reactor vessel at low temperatures. As irradiation embrittles the material of the vessel, the LTOP arming temperature becomes higher. The licensee is proposing to increase the arming temperature from 319 °F to 330 °F to correspond with increasing the PT limit curve applicability to 27.2 EFPYs. TS 3.4.12 uses the LTOP arming temperature to determine when the LTOP system is required to be operable. Note that the LTOP arming temperature is also called the Overpressure Protection System (OPS) enable temperature in Figure 3.4.12-1. This arming temperature is also used in TS 3.4.7 and TS 3.4.10. The new value corresponds to the limiting PT curves for 27.2 EFPYs and is calculated using the methodology approved by the NRC in Reference 4. For this reason, the new arming temperature is acceptable.

3.6 Conclusion

The NRC staff has previously reviewed and approved the analysis of record for IP3 vessel neutron fluence. The conditions and assumptions underlying the validity of the current PT limit curves and LTOP limits are still valid, and the new LTOP arming temperature has been calculated in accordance with an NRC-approved methodology. The editorial changes for the use of "less than," "less than or equal to," "greater than," and "greater than or equal to" symbols are in accordance with standard TS and do not alter the meaning of the TSs. Therefore, the proposed changes are acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the New York State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes surveillance requirements. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no

public comment on such finding (72 FR 17946). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). 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.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, 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.

7.0 REFERENCES

1. Letter from Fred Dacimo, Entergy Nuclear Northeast, to U.S. NRC, "Proposed Change to Indian Point 3 Technical Specifications Regarding Updated Pressure-Temperature and Low Temperature Overpressure Protection System Limits" dated January 18, 2007 (ML070240285).
2. Appendix A to 10 CFR 50, General Design Criterion 30, "Quality of Reactor Coolant Pressure Boundary," and General Design Criterion 31, "Fracture Prevention of Reactor Coolant Pressure Boundary".
3. NRC Regulatory Guide RG 1.190, "Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence," March, 2001.
4. NRC Letter to Entergy for amendment 220, "Indian Point Nuclear Generating Unit No. 3 - Issuance of Amendment Re: Changes to Pressure-Temperature Curves (TAC No. MB9133)," dated December 3, 2003 (ML033370869).
5. NRC Letter to Entergy for amendment 225, "Indian Point Nuclear Generating Unit No. 3 - Issuance of Amendment Re: 4.85 Percent Stretch Power Uprate and Relocation of Cycle-Specific Parameters (TAC No. MC3552)," dated March 24, 2005 (ML050600380).
6. Letter from Michael Kansler, Entergy Nuclear Northeast, to U.S. NRC, "Proposed Change to Indian Point 3 Technical Specifications: Pressure-Temperature and Overpressure Protection System Limits For Up To 20 Effective Full Power Years" dated May 28, 2003 (ML031550595).

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Date: October 4, 2007