February 14, 2002

Mr. Joseph E. Venable
Vice President Operations
Entergy Operations, Inc.
17265 River Road
Killona, LA 70066-0751

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 - ISSUANCE OF AMENDMENT RE: INTEGRATED LEAKAGE RATE TESTING INTERVAL EXTENSION (TAC NO. MB2461)

Dear Mr. Venable:

The Commission has issued the enclosed Amendment No. 178 to Facility Operating License No. NPF-38 for the Waterford Steam Electric Station, Unit 3. The amendment consists of changes to the Technical Specifications in response to your application dated July 23, 2001, as supplemented by letters dated September 21, and November 8, 2001.

The amendment postpones the next Type A test performed after May, 12, 1991, to no later than May 11, 2006. This results in an extended interval of 15 years for performance of the next integrated leakage rate test.

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

Sincerely,

/RA/

N. Kalyanam, Project Manager, Section 1
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosures: 1. Amendment No. 178 to NPF-38
2. Safety Evaluation

cc w/encls: See next page

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Accession No.: ML020460272 *Staff provided SE used with minor editorial changes

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ENTERGY OPERATIONS, INC.

DOCKET NO. 50-382

WATERFORD STEAM ELECTRIC STATION, UNIT 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 178
License No. NPF-38

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Entergy Operations, Inc. (EOI) dated July 23, 2001, as supplemented by letters dated September 21, and November 8, 2001, 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. NPF-38 is hereby amended to read as follows:

   2. Technical Specifications and Environmental Protection Plan

      The Technical Specifications contained in Appendix A, as revised through Amendment No. 178 , and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the license. EOI shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

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

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Robert A. Gramm, Chief, Section 1
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: February 14, 2002

ATTACHMENT TO LICENSE AMENDMENT NO. 178

TO FACILITY OPERATING LICENSE NO. NPF-38

DOCKET NO. 50-382

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	Insert
6-24	6-24

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 178 TO

FACILITY OPERATING LICENSE NO. NPF-38

ENTERGY OPERATIONS, INC.

WATERFORD STEAM ELECTRIC STATION, UNIT 3

DOCKET NO. 50-382

1.0 INTRODUCTION

By letter dated July 23, as supplemented by letters dated September 21, and November 8, 2001, Entergy Operations, Inc. (EOI, the licensee) requested a Technical Specification (TS) change for the Waterford Steam Electric Station, Unit 3 (Waterford 3), that would allow a one-time change in their Appendix J Type A test (containment integrated leakage rate test) interval from the required 10 years to a test interval of 15 years. Without an extension, the licensee would have to perform a Type A test at their next refueling outage.

The September 21, and November 8, 2001, supplemental letters provided additional information that did not change the scope of the request or the initial proposed no significant hazards consideration determination (66 FR 44169, published August 22, 2001).

2.0 BACKGROUND

Pursuant to 10 CFR Part 50, Appendix J, Option B, a Type A test is required to be conducted at a periodic interval based on historical performance of the overall containment system. Waterford 3 TS 6.15 requires that a program shall be established to implement the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR Part 50, Appendix J, Option B, as modified by approved exemptions. Further, it requires that this program shall be in accordance with the guidelines contained in Regulatory Guide (RG) 1.163, "Performance-Based Containment Leak-Test Program," dated September 1995. This RG endorses, with certain exceptions, Nuclear Energy Institute (NEI) 94-01, Revision 0, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," dated July 26, 1995.

Type A testing is an overall (integrated) leakage rate test of the containment structure. NEI 94-01 specifies an initial test interval of 48 months, but allows an extended interval of 10 years, based upon two consecutive successful tests. There is also a provision for extending the test interval an additional 15 months in certain circumstances.

The most recent two Type A tests at Waterford 3 have been successful, so their current interval requirement is 10 years. The licensee is requesting an addition to TS 6.15, "Containment Leakage Rate Testing Program," which would indicate that they are allowed to take an exception from the guidelines of RG 1.163 regarding the Type A test interval. Specifically, the

proposed TS says that the next Type A test to be performed after the May 12, 1991 (the date of the last Type A test), Type A test shall be performed no later than May 11, 2006.

3.0 EVALUATION

3.1 Probabilistic Safety Analysis

3.1.1 Assessment

The July 23, 2001, application included a risk impact assessment of extending the Type A test interval to 15 years. The supplemental letter dated November 8, 2001, provided additional risk impact assessment analysis. In performing the risk assessment, the licensee considered the guidelines of NEI 94-01, the methodology used in Electric Power Research Institute (EPRI) Technical Report TR-104285, "Risk Impact Assessment of Revised Containment Leak Rate Testing," and RG 1.174, "An Approach For Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis."

The basis for the current 10-year test interval is provided in Section 11.0 of NEI 94-01, Revision 0, and was established in 1995 during development of the performance-based Option B to Appendix J. Section 11.0 of NEI 94-01 states that NUREG-1493, "Performance-Based Containment Leak-Test Program," September 1995, provided the technical basis to support rulemaking to revise leakage rate testing requirements contained in Option B to Appendix J. The basis consisted of qualitative and quantitative assessments of the risk impact (in terms of increased public dose) associated with a range of extended leakage rate test intervals. To supplement the Nuclear Regulatory Commission's (NRC or the Commission) rulemaking basis, NEI undertook a similar study. The results of that study are documented in EPRI Research Project Report TR-104285.

The EPRI study used an analytical approach similar to that presented in NUREG-1493 for evaluating the incremental risk associated with increasing the interval for Type A tests. The EPRI study estimated that relaxing the test frequency from 3 in 10 years to 1 in 10 years, will increase the average time that a leak detectable only by a Type A test goes undetected from 18 to 60 months. Since Type A tests only detect about 3 percent of leaks (the rest are identified during local leak rate tests based on industry leakage rate data gathered from 1987 to 1993), this results in a 10 percent increase in the overall probability of leakage. The risk contribution of pre-existing leakage, in percent of person-rem/year, for the pressurized-water reactor (PWR) representative plant was estimated to increase from .032 percent to .035 percent. This confirmed the NUREG-1493 conclusion that a reduction in the frequency of Type A tests from 3 per 10 years to 1 per 10 years leads to an "imperceptible" increase in risk.

Building upon the methodology of the EPRI study, the licensee assessed the change in the predicted person-rem/year frequency. The licensee quantified the risk from sequences that have the potential to result in large releases if a pre-existing leak were present. Since the Option B rulemaking in 1995, the staff has issued RG 1.174 on the use of probabilistic risk assessment (PRA) in risk-informed changes to a plant's licensing basis. The licensee has proposed using RG 1.174 to assess the acceptability of extending the Type A test interval beyond that established during the Option B rulemaking. RG 1.174 defines very small changes in the risk-acceptance guidelines as increases in core damage frequency (CDF) less than 10^{-6} per reactor year and increases in large early release frequency (LERF) less than 10^{-7} per

reactor year. Since the Type A test does not impact CDF, the relevant criterion is the change in LERF. The licensee has estimated the change in LERF for the proposed change and the cumulative change from the original 3 in 10 year interval. RG 1.174 also discusses defense-in-depth and encourages the use of risk analysis techniques to help ensure and show that key principles, such as the defense-in-depth philosophy, are met. The licensee estimated the change in the conditional containment failure probability for the proposed change to demonstrate that the defense-in-depth philosophy is met.

The licensee provided an analysis which estimated all of these risk metrics and whose methodology is consistent with previously approved submittals. The following conclusions can be drawn from the analysis associated with extending the Type A test frequency:

1. A slight increase in risk is predicted when compared to that estimated from current requirements. Given the change from a 10 year test interval to a 15 year test interval, the increase in the total integrated plant risk is estimated to be 0.05 percent. The increase in the total integrated plant risk, given the change from a 3 in 10 year test interval to a 15 year test interval, was 0.14 percent. This is reasonable when compared to the range of risk increase, 0.02 to 0.14 percent, estimated in NUREG-1493 when going from a 3 in 10 year test interval to a 10 year interval. NUREG-1493 concluded that a reduction in the frequency of tests from 3 per 10 years to 1 per 10 years leads to an "imperceptible" increase in risk. Therefore, the increase in the total integrated plant risk for the proposed change is considered small and supportive of the proposed change.

2. RG 1.174 provides guidance for determining the risk impact of plant-specific changes to the licensing basis. RG 1.174 defines very small changes in the risk-acceptance guidelines as increases in CDF less than 10^{-6} per reactor year and increases in LERF less than 10^{-7} per reactor year. Since the Type A test does not impact CDF, the relevant criterion is LERF. The increase in LERF resulting from a change in the Type A test interval from 1 in 10 years to 1 in 15 years is estimated to be 2.6×10^{-8}/year. The increase in LERF resulting from a change in the Type A test interval from the original 3 in 10 years to 1 in 15 years is estimated to be 8.0×10^{-8}/year. Increasing the Type A interval to 15 years is considered to result in a very small change in LERF.

3. RG 1.174 also encourages the use of risk analysis techniques to help ensure and show that the proposed change is consistent with the defense-in-depth philosophy. Consistency with the defense-in-depth philosophy is maintained if a reasonable balance is preserved among prevention of core damage, prevention of containment failure, and consequence mitigation. The change in the conditional containment failure probability was estimated to increase by 0.0008 for the proposed change and 0.0024 for the cumulative change of going from a test interval of 3 in 10 years to 1 in 15 years. The staff finds that the defense-in-depth philosophy is maintained based on the very small change in the conditional containment failure probability for the proposed change.

   The staff recognizes the limitations of a conditional containment failure probability approach. For plants, such as Waterford 3, with CDF estimates well below 10^{-4}, the ability of the containment to withstand events of even lower probability becomes less clear. Therefore, it is important to consider other risk metrics in conjunction with the conditional containment failure probability, such as total LERF. The licensee has

sufficiently demonstrated that the total LERF is less than 10^{-5} for the purpose of this evaluation.

3.1.2 Summary

Based on these conclusions, the staff finds that the increase in predicted risk due to the proposed change is within the acceptance criteria while maintaining the defense-in-depth philosophy of RG 1.174 and, therefore, is acceptable.

3.2 Degradation of Containment Pressure Boundary

This evaluation discusses the licensee's actions taken to address aging degradation of the containment pressure boundary as it relates to the proposed one-time TS amendment of extending the time interval for performing the containment integrated leak rate test (ILRT) from the currently required 10 years to 15 years.

3.2.1 Evaluation

Waterford 3 is a Combustion Engineering PWR with a large, dry (ambient) steel primary containment structure. The containment pressure boundary consists of the steel containment shell structure, containment access penetrations, and process piping and electrical penetrations. The integrity of the penetrations is verified through Type B and Type C local leak rate tests (LLRT) as required by 10 CFR Part 50, Appendix J, and the overall integrity of the containment structure is verified through an ILRT. These tests are performed to verify the essentially leak-tight characteristics of the containment structure at the design basis accident pressure. As stated in the request, Waterford 3 has performed two ILRTs during the period of its operating license. The first ILRT was performed during refueling Outage 2 in May 1988 and the second during Refueling Outage 4 in May 1991. Based on the two successful Type A tests at Waterford 3 and the requirements of 10 CFR Part 50, Appendix J, Option B, the current interval requirement is 10 years. With the requested extension of the ILRT time interval, the next overall verification of the containment leak-tight integrity will be performed in May 2006. Because the leak rate testing requirements (ILRT and LLRTs) of Option B of Appendix J, and the containment inservice inspection (ISI) requirements mandated by 10 CFR 50.55a complement each other in ensuring the leak-tightness and structural integrity of the containment, the staff submitted a request for additional information (RAI) regarding the ISI of the containment and potential areas of weaknesses in the containment that may not be apparent in the risk assessment. The staff's evaluation of the licensee's response to the RAI (supplemental letter dated September 21, 2001) is discussed in the following paragraphs.

The licensee's September 21, 2001, supplemental letter stated that the containment ISI program at Waterford 3 is based on its CEP-CII-003, "Containment Inservice Inspection Program Plan," which was developed in accordance with the requirements of Subsection IWE of the 1992 Edition with 1992 Addenda of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (the Code), Section XI including the NRC staff-approved requests for relief from certain Code requirements. The licensee also discussed, in response to Questions 1 and 2 of the five questions on containment inspections, its containment ISI program, including areas of augmented inspections, and justified how it assured that the containment structural integrity and leak-tight integrity will be maintained during the extended ILRT period.

In response to Question 3 regarding the ISI of seals, gaskets, and bolted connections, the licensee stated that with the approved relief request in these two areas, the alternative examinations of Appendix J, Type B testing will be performed at least once during each containment inspection interval. Thus, the extension requested for Type A testing does not affect the frequency of these alternative examinations in that they will be performed once in the 10-year inspection interval (Option B of Appendix J) for all penetrations except containment airlocks, door seals, and penetrations with resilient seals for which the testing frequency will be performed once every 30 months. Because the extension requested for Type A testing frequency will not affect the alternative examination frequency for penetrations, and the Type B testing frequency for all penetrations meets the guidelines of NEI 94-01 and RG 1.163, the staff finds that the licensee's ISI program provides reasonable assurance that the integrity of the containment pressure boundary will be maintained during the period of the ILRT extension.

In its response to Question 4 regarding the integrity of stainless steel bellows, the licensee stated that Waterford 3 has eight penetrations that incorporate two-ply mechanical bellows in its configuration. The licensee further justified that, based on a review of the purchase specification and discussions with the manufacturers, a wire mesh cloth between the plies ensures a gap for the adequate performance of an Appendix J, Type B test. With the performance criteria of NEI 94-01, which has been endorsed by RG 1.163, the eight mechanical bellows were placed on the 10-year 10 CFR Part 50, Appendix J, Option B extended interval beginning in October 1995. Therefore, the staff finds that the integrity of containment pressure boundary will be maintained for these stainless steel bellows.

General Question No. 5 raised a concern related to the effect of degradations in uninspectable areas of the steel containment vessel (i.e., areas that cannot be visually examined). Because ILRTs help to identify areas of through-wall degradations when the containment vessel is pressurized, the staff questioned how the potential leakages due to age-related degradation were considered in risk assessment of the extended ILRT. In its response, the licensee stated that the potential for containment leakage was explicitly included in the risk assessment. By definition, the intact containment case, EPRI Containment Failure Class 1, includes a leakage term that is independent of the source of the leak. Similarly, the Containment Failure Classes 3a and 3b model the potential leakage impact of the ILRT interval extension. These cases include the potential that the leakage is due to a containment shell failure. The assessment shows that even with the increased potential to have an undetected containment flaw or leak path, the increase in risk is small.

Based on the basis provided in the TS change request and the response to the five general questions, the staff finds that (1) the structural integrity of the containment vessel is verified through the periodic ISIs conducted as required by Subsections IWE and IWL of the ASME Code, Section XI; (2) the integrity of the penetrations, containment isolation valves and mechanical bellows are periodically verified through Type B and Type C tests as required by 10 CFR Part 50, Appendix J and Waterford 3 TS; and (3) the potential for large leakage from the areas that cannot be examined by the ISI has been explicitly modeled in performing the risk assessment. In addition, the system pressure tests for containment pressure boundary (i.e., Appendix J tests, as applicable) are required to be performed following repair and replacement activities in accordance with Article IWE-5000 of the ASME Code, Section XI. Serious degradation of the primary containment pressure boundary is required to be reported under 10 CFR 50.72 and 10 CFR 50.73.

3.2.2 Summary

On the basis of findings discussed above, the staff concludes that a one-time extension of performing the ILRT as proposed by the licensee in Section 6.15 of the proposed TS amendment request is acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Louisiana 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. 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 (66 FR 44169, published August 22, 2001). 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.

Principal Contributors: M. Snodderly, J. Pulsipher, T. Cheng

Date: February 14, 2002

Waterford Generating Station 3

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