



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 31, 2012

Vice President, Operations
Entergy Operations, Inc.
Waterford Steam Electric Station, Unit 3
17265 River Road
Killona, LA 70057-3093

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 - ISSUANCE OF
AMENDMENT RE: TECHNICAL SPECIFICATION CHANGE REGARDING
STEAM GENERATOR TUBE INTEGRITY (TAC NO. ME6852)

Dear Sir or Madam:

The Commission has issued the enclosed Amendment No. 236 to Facility Operating License No. NPF-38 for the Waterford Steam Electric Station, Unit 3 (Waterford 3). This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated July 20, 2011, as supplemented by letter dated May 10, 2012.

The amendment modifies TS 3/4.4.4, "Steam Generator (SG) Tube Integrity," TS 6.5.9, "Steam Generator (SG) Program," and TS 6.9.1.5, "Steam Generator Tube Inspection Report." The two Waterford 3 SGs are being replaced during the 18th refueling outage which commences in the fall of 2012. The existing SG Program under TS 6.5.9 contains an alternate repair criterion for SG tube inspections that is no longer applicable to the replacement SGs. Additionally, the replacement SGs will contain improved Alloy 690 thermally treated tubing material, which extends the SG tubing inservice inspection frequencies beyond that currently allowed by the TSs.

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,

A handwritten signature in black ink, appearing to read "N. Kalyanam", with a horizontal line underneath.

N. Kalyanam, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosures:

1. Amendment No. 236 to NPF-38
2. Safety Evaluation

cc w/encls: Distribution via Listserv



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

ENTERGY OPERATIONS, INC.

DOCKET NO. 50-382

WATERFORD STEAM ELECTRIC STATION, UNIT 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 236
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 20, 2011, as supplemented by letter dated May 10, 2012, 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.

Enclosure 1

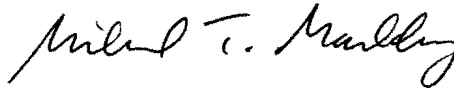
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 2.C.2 of Facility Operating License No. NPF-38 is hereby amended to read as follows:

2. Technical Specifications and Environmental Protection Plan

- The Technical Specifications contained in Appendix A, as revised through Amendment No. 236, 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 prior to the first Steam Generator (SG) tube inservice inspection for the replacement SGs.

FOR THE NUCLEAR REGULATORY COMMISSION



Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Facility Operating
License No. NPF-38 and
Technical Specifications

Date of Issuance: July 31, 2012

ATTACHMENT TO LICENSE AMENDMENT NO. 236

TO FACILITY OPERATING LICENSE NO. NPF-38

DOCKET NO. 50-382

Replace the following pages of the Facility Operating License and 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.

Facility Operating License

REMOVE

INSERT

-4-

-4-

Technical Specifications

REMOVE

INSERT

3/4 4-10

3/4 4-10

6-7a

6-7a

6-7b

6-7b

6-7c

6-7c

6-7d

6-17a

6-17a

or indirectly any control over (i) the facility, (ii) power or energy produced by the facility, or (iii) the licensees of the facility. Further, any rights acquired under this authorization may be exercised only in compliance with and subject to the requirements and restrictions of this operating license, the Atomic Energy Act of 1954, as amended, and the NRC's regulations. For purposes of this condition, the limitations of 10 CFR 50.81, as now in effect and as they may be subsequently amended, are fully applicable to the equity investors and any successors in interest to the equity investors, as long as the license for the facility remains in effect.

- (b) Entergy Louisiana, LLC (or its designee) to notify the NRC in writing prior to any change in (i) the terms or conditions of any lease agreements executed as part of the above authorized financial transactions, (ii) any facility operating agreement involving a licensee that is in effect now or will be in effect in the future, or (iii) the existing property insurance coverages for the facility, that would materially alter the representations and conditions, set forth in the staff's Safety Evaluation enclosed to the NRC letter dated September 18, 1989. In addition, Entergy Louisiana, LLC or its designee is required to notify the NRC of any action by equity investors or successors in interest to Entergy Louisiana, LLC that may have an effect on the operation of the facility.

- C. This license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

- 1. Maximum Power Level

EOI is authorized to operate the facility at reactor core power levels not in excess of 3716 megawatts thermal (100% power) in accordance with the conditions specified herein.

- 2. Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 236, 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.

REACTOR COOLANT SYSTEM

3/4.4.4 STEAM GENERATOR (SG) TUBE INTEGRITY

LIMITING CONDITION FOR OPERATION

- a. SG tube integrity shall be maintained, and
- b. All SG tubes satisfying the tube plugging criteria shall be plugged in accordance with the Steam Generator Program.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

NOTE: Separate ACTION entry is allowed for each SG tube.

- a. With one or more SG tubes satisfying the tube plugging criteria and not plugged in accordance with the Steam Generator Program.
 - 1. Within 7 days verify tube integrity of the affected tube(s) is maintained until the next refueling outage or SG tube inspection, and
 - 2. Plug the affected tube(s) in accordance with the Steam Generator Program prior to entering HOT SHUTDOWN following the next refueling outage or SG tube inspection.
- b. If the required ACTION and Allowed Outage Time of ACTION a above cannot be met or SG tube integrity cannot be maintained, be in HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

- 4.4.4.1 Verify SG tube integrity in accordance with the Steam Generator Program.
- 4.4.4.2 Verify that each inspected SG tube that satisfies the tube plugging criteria is plugged in accordance with the Steam Generator Program prior to entering HOT SHUTDOWN following a SG tube inspection.

ADMINISTRATIVE CONTROLS

6.5.8 INSERVICE TESTING PROGRAM

This program provides controls for inservice testing of ASME Code Class 1, 2, and 3 components. The program shall include the following:

- a. Testing frequencies specified in Section XI of the ASME Boiler and Pressure Vessel Code and applicable Addenda as follows:

<u>ASME Boiler and Pressure Vessel Code and applicable Addenda terminology for inservice testing activities</u>	<u>Required frequencies for performing inservice testing activities</u>
Weekly	At least once per 7 days
Monthly	At least once per 31 days
Quarterly or every 3 months	At least once per 92 days
Semiannually or every 6 months	At least once per 184 days
Every 9 months	At least once per 276 days
Yearly or annually	At least once per 366 days
Biennially or every 2 years	At least once per 731 days

- b. The provisions of Specification 4.0.2 are applicable to the above required frequencies for performing inservice testing activities.
- c. The provisions of Specification 4.0.3 are applicable to inservice testing activities, and
- d. Nothing in the ASME Boiler and Pressure Vessel Code shall be construed to supersede the requirements of any Technical Specification.

6.5.9 STEAM GENERATOR (SG) PROGRAM

A Steam Generator Program shall be established and implemented to ensure that SG tube integrity is maintained. In addition, the Steam Generator Program shall include the following:

- a. Provisions for condition monitoring assessments. Condition monitoring assessment means an evaluation of the "as found" condition of the tubing with respect to the performance criteria for structural integrity and accident induced leakage. The "as found" condition refers to the condition of the tubing during an SG inspection outage, as determined from the inservice inspection results or by other means, prior to the plugging of tubes. Condition monitoring assessments shall be conducted during each outage during which the SG tubes are inspected or plugged to confirm that the performance criteria are being met.

ADMINISTRATIVE CONTROLS

STEAM GENERATOR (SG) PROGRAM (Continued)

- b. Performance criteria for SG tube integrity. SG tube integrity shall be maintained by meeting the performance criteria for tube structural integrity, accident induced leakage, and operational leakage.
 - 1. Structural integrity performance criterion: All in-service steam generator tubes shall retain structural integrity over the full range of normal operating conditions (including startup, operation in the power range, hot standby, and cool down), all anticipated transients included in the design specification, and design basis accidents. This includes retaining a safety factor of 3.0 against burst under normal steady state full power operation primary to secondary pressure differential and a safety factor of 1.4 against burst applied to the design basis accident primary to secondary pressure differentials. Apart from the above requirements, additional loading conditions associated with the design basis accidents, or combination of accidents in accordance with the design and licensing basis, shall also be evaluated to determine if the associated loads contribute significantly to burst or collapse. In the assessment of tube integrity, those loads that do significantly affect burst or collapse shall be determined and assessed in combination with the loads due to pressure with a safety factor of 1.2 on the combined primary loads and 1.0 on axial secondary loads.
 - 2. Accident induced leakage performance criterion: The primary to secondary accident induced leakage rate for any design basis accident, other than a SG tube rupture, shall not exceed the leakage rate assumed in the accident analysis in terms of total leakage rate for all SGs and leakage rate for an individual SG. Primary to secondary leakage is not to exceed 540 gpd through any one SG.
 - 3. The operational leakage performance criterion is specified in LCO 3.4.5.2, "Reactor Coolant System Operational Leakage."
- c. Provisions for SG tube plugging criteria. Tubes found by inservice inspection to contain flaws with a depth equal to or exceeding 40% of the nominal tube wall thickness shall be plugged.

ADMINISTRATIVE CONTROLS

STEAM GENERATOR (SG) PROGRAM (Continued)

- d. Provisions for SG tube inspections. Periodic SG tube inspections shall be performed. The number and portions of the tubes inspected and methods of inspection shall be performed with the objective of detecting flaws of any type (e.g., volumetric flaws, axial and circumferential cracks) that may be present along the length of the tube, from the tube-to-tubesheet weld at the tube inlet to the tube-to-tubesheet weld at the tube outlet and that may satisfy the applicable tube plugging criteria. The tube-to-tubesheet weld is not part of the tube. In addition to meeting the requirements of d.1, d.2, and d.3 below, the inspection scope, inspection methods, and inspection intervals shall be such as to ensure that SG tube integrity is maintained until the next SG inspection. A degradation assessment shall be performed to determine the type and location of flaws to which the tubes may be susceptible and, based on this assessment, to determine which inspection methods need to be employed and at what locations.
1. Inspect 100% of the tubes in each SG during the first refueling outage following SG installation.
 2. After the first refueling outage following SG installation, inspect each SG at least every 72 effective full power months or at least every third refueling outage (whichever results in more frequent inspections). In addition, the minimum number of tubes inspected at each scheduled inspection shall be the number of tubes in all SGs divided by the number of SG inspection outages scheduled in each inspection period as defined in a, b, c and d below. If a degradation assessment indicates the potential for a type of degradation to occur at a location not previously inspected with a technique capable of detecting this type of degradation at this location and that may satisfy the applicable tube repair criteria, the minimum number of locations inspected with such a capable inspection technique during the remainder of the inspection period may be prorated. The fraction of locations to be inspected for this potential type of degradation at this location at the end of the inspection period shall be no less than the ratio of the number of times the SG is scheduled to be inspected in the inspection period after the determination that a new form of degradation could potentially be occurring at this location divided by the total number of times the SG is scheduled to be inspected in the inspection period. Each inspection period defined below may be extended up to 3 effective full power months to include a SG inspection outage in an inspection period and the subsequent inspection period begins at the conclusion of the included SG inspection outage.
 - a) After the first refueling outage following SG installation, inspect 100% of the tubes during the next 144 effective full power months. This constitutes the first inspection period;
 - b) During the next 120 effective full power months, inspect 100% of the tubes. This constitutes the second inspection period;

ADMINISTRATIVE CONTROLS

STEAM GENERATOR (SG) PROGRAM (Continued)

- c) During the next 96 effective full power months, inspect 100% of the tubes. This constitutes the third inspection period; and
 - d) During the remaining life of the SGs, inspect 100% of the tubes every 72 effective full power months. This constitutes the fourth and subsequent inspection periods.
- 3. If crack indications are found in any SG tube, then the next inspection for each affected and potentially affected SG for the degradation mechanism that caused the crack indication shall not exceed 24 effective full power months or one refueling outage (whichever results in more frequent inspections). If definitive information, such as from examination of a pulled tube, diagnostic non-destructive testing, or engineering evaluation indicates that a crack-like indication is not associated with a crack(s), then the indication need not be treated as a crack.
- e. Provisions for monitoring operational primary to secondary leakage.

ADMINISTRATIVE CONTROLS

ANNUAL REPORTS (Continued)

- (1) Reactor power history starting 48 hours prior to the first sample in which the limit was exceeded;
- (2) Results of the last isotopic analysis for radioiodine performed prior to exceeding the limit, results of analysis while limit was exceeded and results of one analysis after the radioiodine activity was reduced to less than limit. Each result should include date and time of sampling and the radioiodine concentrations;
- (3) Clean-up system flow history starting 48 hours prior to the first sample in which the limit was exceeded;
- (4) Graph of the I-131 concentration and one other radioiodine isotope concentration in microcuries per gram as a function of time for the duration of the specific activity above steady-state level; and
- (5) The time duration when the specific activity of the primary coolant exceeded the radioiodine limit.

6.9.1.5 STEAM GENERATOR TUBE INSPECTION REPORT

A report shall be submitted within 180 days after the initial entry into HOT SHUTDOWN following completion of an inspection performed in accordance with the Specification 6.5.9, Steam Generator (SG) Program. The report shall include:

- a. The scope of inspections performed on each SG,
- b. Degradation mechanisms found,
- c. Nondestructive examination techniques utilized for each degradation mechanism,
- d. Location, orientation (if linear), and measured sizes (if available) of service induced indications,
- e. Number of tubes plugged during the inspection outage for each degradation mechanism,
- f. The number and percentage of tubes plugged to date, and the effective plugging percentage in each steam generator,
- g. The results of condition monitoring, including the results of tube pulls and in-situ testing.



UNITED STATES
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WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 236 TO

FACILITY OPERATING LICENSE NO. NPF-38

ENTERGY OPERATIONS, INC.

WATERFORD STEAM ELECTRIC STATION, UNIT 3

DOCKET NO. 50-382

1.0 INTRODUCTION

By application dated July 20, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12166A293), as supplemented by letter dated May 10, 2012 (ADAMS Accession No. ML12136A240), Entergy Operations, Inc. (Entergy, the licensee), requested changes to the Technical Specifications (TSs) for Waterford Steam Electric Station, Unit 3 (Waterford 3). The proposed changes would modify TS 3/4.4.4, "Steam Generator (SG) Tube Integrity," TS 6.5.9, "Steam Generator (SG) Program," and TS 6.9.1.5, "Steam Generator Tube Inspection Report," and support the replacement of the steam generators (SGs) at Waterford 3 during the fall 2012 outage. The supplemental letter dated May 10, 2012, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the U.S. Nuclear Regulatory Commission (NRC) staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on October 4, 2011 (76 FR 61395).

The licensee submitted this license amendment request (LAR) prior to NRC approval of Technical Specification Task Force (TSTF) Change Traveler TSTF-510, Revision 2, "Revision to Steam Generator Program Inspection Frequencies and Tube Sample Selection," but stated that the LAR was consistent with TSTF-510, Revision 2. The notice of availability of TSTF-510, Revision 2, was published in the *Federal Register* on October 27, 2011 (76 FR 66763), as part of the consolidated line item improvement process.

Entergy will be replacing the two Waterford 3 steam generators (SGs) during the 18th refueling outage, which commences in the fall of 2012. The existing Waterford 3 SG Program under TS 6.5.9 contains an alternate repair criterion for SG tube inspections that is no longer applicable to the replacement SGs. Additionally, the replacement SGs (RSGs) will contain improved Alloy 690 thermally treated tubing material. Therefore, the SG tubing inservice inspection frequencies may be extended beyond that allowed currently by the Waterford TSs.

2.0 REGULATORY EVALUATION

Steam generator tubes function as an integral part of the reactor coolant pressure boundary (RCPB) and also serve to isolate radiological fission products in the primary coolant from the secondary coolant and the environment. For the purposes of this safety evaluation, tube integrity means that the tubes are capable of performing these functions in accordance with the plant design and licensing basis.

Title 10 of the *Code of Federal Regulations* (10 CFR) establishes the fundamental regulatory requirements with respect to the integrity of the SG tubing. Specifically, the General Design Criteria (GDC) in Appendix A to 10 CFR Part 50 state that the RCPB shall have "an extremely low probability of abnormal leakage...and gross rupture" (GDC 14, "Reactor coolant pressure boundary"), "shall be designed with sufficient margin" (GDC 15, "Reactor coolant system design," and GDC 31, "Fracture prevention of reactor coolant pressure boundary"), shall be of "the highest quality standards possible" (GDC 30, "Quality of reactor coolant pressure boundary"), and shall be designed to permit "periodic inspection and testing...to assess... structural and leak tight integrity" (GDC 32, "Inspection of reactor coolant pressure boundary"). To this end, 10 CFR 50.55a(c), "Reactor coolant pressure boundary," specifies that components which are part of the RCPB must meet the requirements for Class 1 components in Section III of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code). Section 50.55a(g), "Inservice inspection requirements," further requires that components and supports which are classified as ASME Code Class 1 must be designed and be provided with access to enable the performance of inservice examination of these components and must meet the pre-service examination requirements set forth in the editions and addenda of Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," of the ASME Code incorporated by reference in 10 CFR 50.55a(b), "Standards approved for incorporation by reference," that were applied to the construction of the particular component. Section XI requirements pertaining to inservice inspection of SG tubing are augmented by additional SG tube surveillance requirements in the TSs.

As part of the plant licensing basis, applicants for pressurized-water reactor licenses are required to analyze the consequences of postulated design-basis accidents such as an SG tube rupture and main steamline break. These analyses consider the primary-to-secondary leakage that may occur during these events and must show that the offsite radiological consequences do not exceed the applicable limits of the 10 CFR Section 100.11, "Determination of exclusion area, low population zone, and population center distance," guidelines for offsite doses (or 10 CFR 50.67, "Accident source term," as appropriate), the criteria in GDC 19, "Control room," for control room operator doses, or some fraction thereof as appropriate to the accident, or the NRC-approved licensing basis.

TS 6.5.9, "Steam Generator (SG) Program," for Waterford 3 requires that a SG Program be established and implemented to ensure that SG tube integrity is maintained. Tube integrity is maintained by meeting specified performance criteria for structural and leakage integrity consistent with the plant design and licensing bases. TS 6.5.9.a requires that a condition monitoring assessment be performed during each outage during which the SG tubes are inspected or plugged to confirm that the performance criteria are being met. TS 6.5.9.d includes provisions regarding the scope, frequency, and methods of SG tube inspections.

3.0 TECHNICAL EVALUATION

3.1 Proposed TS Changes

3.1.1. 3/4.4.4 STEAM GENERATOR (SG) TUBE INTEGRITY

Current Limiting Condition for Operation (LCO) 3.4.4.b states:

- b. All SG tubes satisfying the tube repair criteria shall be plugged in accordance with the Steam Generator Program.

Revised LCO 3.4.4.b would state:

- b. All SG tubes satisfying the tube plugging criteria shall be plugged in accordance with the Steam Generator Program.

Current ACTION 3.4.4.a states:

- a. With one or more SG tubes satisfying the tube repair criteria and not plugged in accordance with the Steam Generator Program.

Revised ACTION 3.4.4.a would state:

- a. With one or more SG tubes satisfying the tube plugging criteria and not plugged in accordance with the Steam Generator Program.

Current Surveillance Requirement 4.4.4.2 states:

4.4.4.2 Verify that each inspected SG tube that satisfies the tube repair criteria is plugged in accordance with the Steam Generator Program prior to entering HOT SHUTDOWN following a SG tube inspection.

Revised Surveillance Requirement 4.4.4.2 would state:

4.4.4.2 Verify that each inspected SG tube that satisfies the tube plugging criteria is plugged in accordance with the Steam Generator Program prior to entering HOT SHUTDOWN following a SG tube inspection.

3.1.2 6.5.9 STEAM GENERATOR (SG) PROGRAM

Current TS 6.5.9 STEAM GENERATOR (SG) PROGRAM states, in part:

A Steam Generator Program shall be established and implemented to ensure that SG tube integrity is maintained. In addition, the Steam Generator Program shall include the following provisions:

Revised TS 6.5.9 STEAM GENERATOR (SG) PROGRAM would state, in part:

A Steam Generator Program shall be established and implemented to ensure that SG tube integrity is maintained. In addition, the Steam Generator Program shall include the following:

Current TS 6.5.9.b.1 states, in part:

1. Structural integrity performance criterion: All in-service steam generator tubes shall retain structural integrity over the full range of normal operating conditions (including startup, operation in the power range, hot standby, and cool down and all anticipated transients included in the design specification) and design basis accidents.

Revised TS 6.5.9.b.1 would state, in part:

- b. Structural integrity performance criterion: All in-service steam generator tubes shall retain structural integrity over the full range of normal operating conditions (including startup, operation in the power range, hot standby, and cool down), all anticipated transients included in the design specification, and design basis accidents.

Current TS 6.5.9.c states:

- c. Provisions for SG tube repair criteria. Tubes found by inservice inspection to contain flaws with a depth equal to or exceeding 40% of the nominal tube wall thickness shall be plugged.

The following alternate tube repair criteria may be applied as an alternative to the 40% depth based criteria:

1. Flaws located greater than 10.6 inches below the bottom of the hot leg expansion transition or top of the hot leg tubesheet, whichever is lower, may remain in service. Degradation detected between 10.6 inches below the bottom of the hot leg expansion transition or top of the hot leg tubesheet, whichever is lower, and the bottom of the hot leg expansion transition or top of the hot leg tubesheet, whichever is higher, shall be plugged on detection.

Revised TS 6.5.9.c would state:

- c. Provisions for SG tube plugging criteria. Tubes found by inservice inspection to contain flaws with a depth equal to or exceeding 40% of the nominal tube wall thickness shall be plugged.

Current TS 6.5.9.d states:

- d. Provisions for SG tube inspections. Periodic SG tube inspections shall be performed. The number and portions of the tubes inspected and methods of inspection shall be performed with the objective of detecting flaws of any type (e.g., volumetric flaws, axial and circumferential cracks) that may be present along the length of the tube, from 10.6 inches below the bottom of the hot leg expansion transition or top of the hot leg tubesheet, whichever is lower, completely around the U-bend to the tube-to-tubesheet weld at the tube outlet and that may satisfy the applicable tube repair criteria. The tube-to-tubesheet weld is not part of the tube. In addition to meeting the requirements of d.1, d.2, and d.3 below, the inspection scope, inspection methods, and inspection intervals shall be such as to ensure that SG tube integrity is maintained until the next SG inspection. An assessment of degradation shall be performed to determine the type and location of flaws to which the tubes may be susceptible and, based on this assessment, to determine which inspection methods need to be employed and at what locations.

Revised TS 6.5.9.d would state:

- d. Provisions for SG tube inspections. Periodic SG tube inspections shall be performed. The number and portions of the tubes inspected and methods of inspection shall be performed with the objective of detecting flaws of any type (e.g., volumetric flaws, axial and circumferential cracks) that may be present along the length of the tube, from the tube-to-tubesheet weld at the tube inlet to the tube-to-tubesheet weld at the tube outlet and that may satisfy the applicable tube plugging criteria. The tube-to-tubesheet weld is not part of the tube. In addition to meeting the requirements of d.1, d.2, and d.3 below, the inspection scope, inspection methods, and inspection intervals shall be such as to ensure that SG tube integrity is maintained until the next SG inspection. A degradation assessment shall be performed to determine the type and location of flaws to which the tubes may be susceptible and, based on this assessment, to determine which inspection methods need to be employed and at what locations.

Current TS 6.5.9.d.1 states:

1. Inspect 100% of the tubes in each SG during the first refueling outage following SG replacement.

Revised TS 6.5.9.d.1 would state:

1. Inspect 100% of the tubes in each SG during the first refueling outage following SG installation.

Current TS 6.5.9.d.2 states:

2. Inspection 100% of the tubes at sequential periods of 60 effective full power months. The first sequential period shall be considered to begin after the first inservice inspection of the SGs. No SG shall operate for more than 24 effective full power months or one refueling outage (whichever is less) without being inspected.

Revised TS 6.5.9.d.2 would state:

2. After the first refueling outage following SG installation, inspect each SG at least every 72 effective full power months or at least every third refueling outage (whichever results in more frequent inspections). In addition, the minimum number of tubes inspected at each scheduled inspection shall be the number of tubes in all SGs divided by the number of SG inspection outages scheduled in each inspection period as defined in a, b, c and d below. If a degradation assessment indicates the potential for a type of degradation to occur at a location not previously inspected with a technique capable of detecting this type of degradation at this location and that may satisfy the applicable tube repair criteria, the minimum number of locations inspected with such a capable inspection technique during the remainder of the inspection period may be prorated. The fraction of locations to be inspected for this potential type of degradation at this location at the end of the inspection period shall be no less than the ratio of the number of times the SG is scheduled to be inspected in the inspection period after the determination that a new form of degradation could potentially be occurring at this location divided by the total number of times the SG is scheduled to be inspected in the inspection period. Each inspection period defined below may be extended up to 3 effective full power months to include a SG inspection outage in an inspection period and the subsequent inspection period begins at the conclusion of the included SG inspection outage.
 - a) After the first refueling outage following SG installation, inspect 100% of the tubes during the next 144 effective full power months. This constitutes the first inspection period;
 - b) During the next 120 effective full power months, inspect 100% of the tubes. This constitutes the second inspection period;
 - c) During the next 96 effective full power months, inspect 100% of the tubes. This constitutes the third inspection period; and
 - d) During the remaining life of the SGs, inspect 100% of the tubes every 72 effective full power months. This constitutes the fourth and subsequent inspection periods.

Current TS 6.5.9.d.3 states:

3. If crack indications are found in any SG tube, then the next inspection for each SG for the degradation mechanism that caused the crack indication shall not exceed 24 effective full power months or one refueling outage (whichever is less). If definitive information, such as from examination of a pulled tube, diagnostic non-destructive testing, or engineering evaluation indicates that a crack-like indication is not associated with a crack(s), then the indication need not be treated as a crack.

Revised TS 6.5.9.d.3 would state:

3. If crack indications are found in any SG tube, then the next inspection for each affected and potentially affected SG for the degradation mechanism that caused the crack indication shall not exceed 24 effective full power months or one refueling outage (whichever results in more frequent inspections). If definitive information, such as from examination of a pulled tube, diagnostic non-destructive testing, or engineering evaluation indicates that a crack-like indication is not associated with a crack(s), then the indication need not be treated as a crack.

3.1.3 6.9.1.5 STEAM GENERATOR TUBE INSPECTION REPORT

Current TS 6.9.1.5 states:

A report shall be submitted within 180 days after the initial entry into HOT SHUTDOWN following completion of an inspection performed in accordance with the Specification 6.5.9, Steam Generator (SG) Program. The report shall include:

- a. The scope of inspections performed on each SG,
- b. Active degradation mechanisms found,
- c. Nondestructive examination techniques utilized for each degradation mechanism,
- d. Location, orientation (if linear), and measured sizes (if available) of service induced indications,
- e. Number of tubes plugged during the inspection outage for each active degradation mechanism,
- f. Total number and percentage of tubes plugged to date,

- g. The results of condition monitoring, including the results of tube pulls, in-situ testing, and assessment of accident-induced leakage from all tubesheet indications, and
- h. The effective plugging percentage for all plugging in each SG.

Revised TS 6.9.1.5 STEAM GENERATOR TUBE INSPECTION REPORT would state:

A report shall be submitted within 180 days after the initial entry into. HOT SHUTDOWN following completion of an inspection performed in accordance with the Specification 6.5.9, Steam Generator (SG) Program. The report shall include:

- a. The scope of inspections performed on each SG,
- b. Degradation mechanisms found,.
- c. Nondestructive examination techniques utilized for each degradation mechanism,
- d. Location, orientation (if linear), and measured sizes (if available) of service induced indications,
- e. Number of tubes plugged during the inspection outage for each degradation mechanism,
- f. The number and percentage of tubes plugged to date, and the effective plugging percentage in each steam generator,
- g. The results of condition monitoring, including the results of tube pulls and in-situ testing.

3.2 NRC Staff Evaluation

Waterford 3 currently has two Model 70 SGs designed and fabricated by Combustion Engineering, with each SG containing 9,350 vertical U-tubes. The mill-annealed Alloy 600 SG tubes have a nominal outside diameter of 0.750 inches and a nominal wall thickness of 0.048 inches.

The two RSGs will each contain 8,968 vertical U-tubes made from thermally treated Alloy 690. The tubes in the RSGs have a nominal outside diameter of 0.750 inches and a nominal tube wall thickness of 0.044 inches (rows 1 and 2) or 0.043 inches (rows 3 through 138). The RSGs are scheduled to be installed during the 18th refueling outage, which is scheduled to commence in the fall of 2012.

Because of the good performance record of thermally treated Alloy 690 tube material in the U.S. operating reactor fleet, the licensee concluded that the only degradation mechanism with

potential to reduce tube life and tube integrity is tube wear. Therefore, the licensee proposed to eliminate the current alternate repair criterion that is applicable to flaws (primarily cracks) in the portion of the tube in the tubesheet in the original SGs, and is not proposing any alternate repair criteria for the RSGs. The current alternate repair criterion is contained in TS 6.5.9.c.1. The licensee also proposed to remove the TS inspection requirements associated with this alternate tube repair criterion. These requirements are contained in TS 6.5.9.d (Provisions for SG tube inspections). The NRC staff concludes that the changes are acceptable since these requirements were developed for the licensee's original SGs. With the planned replacement of the SGs, these requirements are no longer needed. In addition, given the design differences between the original and replacement SGs, these requirements are not applicable to the RSGs.

The licensee proposed to adopt inspection requirements applicable to SGs with thermally treated Alloy 690 tubes (i.e., the material used in the replacement SGs). The NRC staff concludes that these changes are acceptable since the licensee's replacement SGs have thermally treated Alloy 690 tubes rather than mill-annealed Alloy 600 tubes, and the proposed changes are consistent with TSTF-510, Revision 2, which the staff has already reviewed and approved, as noted previously (76 FR 44763). In its application, the licensee indicated that the inspection requirements in TSTF-510 for mill-annealed Alloy 600 tubing and the thermally treated Alloy 690 tubing are expected to produce the same outcome (i.e., that tube integrity will continue to be maintained). This statement was made in the context of the prescriptive (or maximum) inspection intervals listed in the TSs. The NRC staff agrees that the desired outcome of the inspections is the same regardless of the tube material and bases this conclusion on the performance-based inspection requirements. The performance-based inspection requirements in the TSs require that inspection intervals be established to ensure that SG tube integrity is maintained until the next SG inspection.

A structural integrity analysis for the RSGs was performed by Westinghouse Electric Company. The analysis was performed, in part, to confirm the adequacy of the tube repair criteria (plugging criteria) contained in the TSs. The licensee used the guidance of NRC Regulatory Guide 1.121, "Bases for Plugging Degraded PWR Steam Generator Tubes," August 1976 (ADAMS Accession No. ML003739366), in performing this analysis. As discussed in Regulatory Guide 1.121, this analysis accounts for flaw growth between inspections and eddy current measurement uncertainty. In this analysis, a 15 percent through-wall allowance was used to account for flaw growth and measurement uncertainty. To maintain this allowance of 15 percent between the plugging criteria and the tube's structural limit under all design basis conditions (normal, transient, and design basis accidents), the licensee determined that it must restrict the reactor coolant system pressure and temperature during normal heatup and cooldown. These pressure and temperature restrictions on the heatup and cooldown will be incorporated into operating procedures prior to operation with the replacement steam generators. The NRC staff concludes that the tube plugging criterion is acceptable since it was determined in accordance with Regulatory Guide 1.121.

In addition to the changes proposed to reflect the replacement of the SGs, the licensee also proposed to adopt the changes specified in TSTF-510, Revision 2. The changes in TSTF-510, Revision 2, reflect licensees' early implementation experience with their current TSs. The changes in TSTF-510, Revision 2, are editorial corrections, changes, and clarifications intended to improve internal consistency, consistency with implementing industry documents, and

usability without changing the intent of the requirements. The proposed changes are an improvement to the existing SG inspection requirements and continue to provide assurance that the plant licensing basis will be maintained between SG inspections. The NRC staff approved TSTF-510, Revision 2, for use with the consolidated line item improvement process on October 19, 2011 (ADAMS Accession No. ML112101604). Other than the variations/deviations discussed below, the licensee did not propose any variations or deviations from the TS changes described in TSTF-510, Revision 2.

The Waterford 3 TSs use different numbering and titles than the Standard Technical Specifications on which TSTF-510, Revision 2, was based. These differences are administrative and do not affect the applicability of TSTF-510, Revision 2, to the Waterford 3 TSs. As a result, the NRC staff concludes that the differences between what was approved for TSTF-510, Revision 2, and what the licensee proposed is acceptable.

The licensee also proposed one additional change that went beyond the changes made by TSTF-510, Revision 2. In TS 6.5.9.d, the licensee replaced the words "tube repair criteria" with the words "tube plugging criteria." The replacement of "repair" with "plugging" in TS 6.5.9.d is an administrative change that makes the wording in the TS consistent and the NRC staff concludes that this change is acceptable.

Based on the above, the NRC staff concludes that the proposed changes to the steam generator TS requirements are acceptable since the resultant TSs are consistent with TSTF-510, Revision 2, and reflect the tube material in the RSGs.

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 published in the *Federal Register* on October 4, 2011 (76 FR 61395). 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) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: A. Johnson

Date: July 31, 2012

July 31, 2012

Vice President, Operations
Entergy Operations, Inc.
Waterford Steam Electric Station, Unit 3
17265 River Road
Killona, LA 70057-3093

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 - ISSUANCE OF
AMENDMENT RE: TECHNICAL SPECIFICATION CHANGE REGARDING
STEAM GENERATOR TUBE INTEGRITY (TAC NO. ME6852)

Dear Sir or Madam:

The Commission has issued the enclosed Amendment No. 236 to Facility Operating License No. NPF-38 for the Waterford Steam Electric Station, Unit 3 (Waterford 3). This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated July 20, 2011, as supplemented by letter dated May 10, 2012.

The amendment modifies TS 3/4.4.4, "Steam Generator (SG) Tube Integrity," TS 6.5.9, "Steam Generator (SG) Program," and TS 6.9.1.5, "Steam Generator Tube Inspection Report." The two Waterford 3 SGs are being replaced during the 18th refueling outage which commences in the fall of 2012. The existing SG Program under TS 6.5.9 contains an alternate repair criterion for SG tube inspections that is no longer applicable to the replacement SGs. Additionally, the replacement SGs will contain improved Alloy 690 thermally treated tubing material, which extends the SG tubing inservice inspection frequencies beyond that currently allowed by the TSs.

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
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosures:

1. Amendment No. 236 to NPF-38
2. Safety Evaluation

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AJohnson, NRR/DE/ESGB

RGrover, NRR/DSS/STSB

ADAMS Accession No. ML12152A341

*SE memo dated

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DATE	7/10/12	6/29/12	5/25/12	7/30/12
OFFICE	OGC – NLO	NRR/DORL/LPL4/BC	NRR/DORL/LPL4/PM	
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