Progress Energy

Crystal River Nuclear Plant
Docket No. 50-302
Operating License No. DPR-72

Ref: 10 CFR 50.90

January 22, 2008
3F0108-14

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: Crystal River Unit 3 – License Amendment Request #298, Revision 0: Application to Modify Improved Technical Specifications for Replacement Steam Generators

References: NRC to Crystal River Unit 3 Letter dated May 16, 2007, "Crystal River Unit 3 - Issuance of Amendment Regarding Steam Generator Tube Inspection Program (TAC NO. MD2054)"

Dear Sir:

In accordance with the provisions of 10 CFR 50.90, Florida Power Corporation (FPC), doing business as Progress Energy Florida, Inc., hereby provides License Amendment Request (LAR) #298, Revision 0. The proposed amendment would revise the Crystal River Unit 3 (CR-3) Improved Technical Specification (ITS) requirements related to steam generator tube integrity for replacement steam generators.

By the letter referenced above, License Amendment #223 was approved for CR-3 implementing Revision 4 to Technical Specification Task Force (TSTF) Standard Technical Specification Change Traveler 449 (TSTF-449) for the existing Steam Generators. This LAR seeks implementation of TSTF-449 for the replacement Steam Generators which are being installed during the Fall 2009 Refueling Outage 16R. In regard to the elements of TSTF-449, the replacement Steam Generators differ from the existing Steam Generators in that the tubing material is Alloy 690 Thermally Treated (TT) in the replacements versus Alloy 600 in the existing Generators. As appropriate to the material change, this submittal is consistent with, and utilizes elements of TSTF-449. This LAR also removes information related to repair techniques and products approved for the existing Steam Generators but not for the replacements.

Progress Energy Florida, Inc.
Crystal River Nuclear Plant
15760 W. Powerline Street
Crystal River, FL 34428

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Attachment A provides a description of the proposed change and confirmation of applicability. Attachment B provides the existing ITS pages marked-up to show the proposed change, and Attachment C provides those same changes presented more formally with revision bars. Attachments D and E provide similar formats for the related Bases sections. Attachment F provides a list of Regulatory Commitments.

FPC requests approval of the proposed license amendment by February 28, 2009, with the amendment to be implemented upon startup from Refueling Outage 16R.

In accordance with 10 CFR 50.91, a copy of this application with enclosures is being provided to the designated Florida State Official.

The CR-3 Plant Nuclear Safety Committee has reviewed this request and recommended it for approval.

If you have any questions regarding this submittal, please contact Mr. Dennis Herrin, Acting Supervisor, Licensing and Regulatory Programs at (352) 563-4633.

Sincerely,

Dale E Young

Dale Young
Vice President
Crystal River Nuclear Plant

DY/scp

Attachments:
- A. Description and Assessment
- B. Proposed Improved Technical Specification Changes (Mark-up)
- C. Proposed Improved Technical Specification Changes (Revision Bar Format)
- D. Proposed Improved Technical Specification Bases Pages (Mark-up)
- E. Proposed Improved Technical Specification Bases Pages (Revision Bar Format)
- F. List of Regulatory Commitments

xc: NRR Project Manager
Regional Administrator, Region II
Senior Resident Inspector
State Contact

STATE OF FLORIDA

COUNTY OF CITRUS

Dale Young states that he is the Vice President, Crystal River Nuclear Plant for Florida Power Corporation, doing business as Progress Energy Florida, Inc.; that he is authorized on the part of said company to sign and file with the Nuclear Regulatory Commission the information attached hereto; and that all such statements made and matters set forth therein are true and correct to the best of his knowledge, information, and belief.

Dale E Young

Dale Young
Vice President
Crystal River Nuclear Plant

The foregoing document was acknowledged before me this 22 day of January, 2008, by Dale Young.

Carolyn E Portmann

Signature of Notary Public
State of Florida

CAROLYN E. PORTMANN
Notary Public - State of Florida
My Commission Expires Mar 1, 2010
Commission # DD 524380
Bonded By National Notary Assn.

(Print, type, or stamp Commissioned
Name of Notary Public)

Personally Known ✓ -OR- Produced Identification _____

PROGRESS ENERGY FLORIDA, INC.

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 / LICENSE NUMBER DPR-72

LICENSE AMENDMENT REQUEST #298, Revision 0

Application to Modify Improved Technical Specifications For Replacement Steam Generators

ATTACHMENT A

Description and Assessment

Description and Assessment

1.0 INTRODUCTION

By letter dated May 16, 2007, License Amendment #223 was approved for Crystal River Unit 3 (CR-3) implementing Revision 4 to Technical Specification Task Force (TSTF) Standard Technical Specification Change Traveler TSTF-449 for the existing Steam Generators. This License Amendment Request (LAR) seeks implementation of TSTF-449 for the replacement Steam Generators which are being installed during the Fall 2009 Refueling Outage 16R. In regard to the elements of TSTF-449, the replacement Steam Generators differ from the existing Steam Generators in that the tubing material is Alloy 690 Thermally Treated (TT) in the replacements versus Alloy 600 in the existing Generators. As appropriate to the material change, this submittal is consistent with, and utilizes elements of TSTF-449. This LAR also removes information related to repair techniques and products approved for the existing Steam Generators but not for the replacements.

The elements of TSTF-449 regarding the Improved Technical Specification (ITS) definition of LEAKAGE and ITS 3.4.12, RCS [Reactor Coolant System] Operational LEAKAGE, were incorporated into the CR-3 ITS by License Amendment #223. Those elements are consistent with this proposed change. Since those elements are integral to the overall maintenance of steam generator tube integrity, reference to them in the Federal Register Notice (Reference 1) discussions applicable to Sections 3.0 through 8.0 below continues to remain appropriate.

2.0 DESCRIPTION OF PROPOSED AMENDMENT

The proposed ITS changes include:

- Revised ITS 3.4.16, Steam Generator (OTSG) Tube Integrity
- Revised ITS 5.6.2.10, Steam Generator (OTSG) Program
- Revised ITS 5.7.2, Special Reports

The revisions are necessary due to two factors. The inspection frequency for Alloy 690 TT tube material, as defined in TSTF-449, differs from the inspection frequency for Alloy 600, and the tube repair processes and products in the existing Technical Specifications are not applicable to the replacement OTSGs.

ITS 3.4.16 is revised to remove references to 'repair' of steam generator tubes. There are no repair processes approved for the replacement steam generators.

ITS 5.6.2.10 is revised to change the tube inspection frequency, as specified in TSTF-449, from that applicable to Alloy 600 to that applicable to Alloy 690 TT.

ITS 5.6.2.10 is revised to delete information on repair techniques, and ITS 5.7.2 is revised to remove reporting requirements associated with the deleted repair techniques.

Proposed revisions to the ITS Bases are also included in this application for information only. As discussed in the NRC's model safety evaluation, adoption of the revised ITS Bases associated with TSTF-449, Revision 4, is an integral part of implementing this ITS improvement. The changes to the affected ITS Bases pages will be incorporated in accordance with the CR-3 ITS Bases Control Program.

3.0 BACKGROUND

The background for the inspection frequency is adequately addressed by the NRC Notice of Availability published on May 6, 2005 (70 FR 24126), the NRC Notice for Comment published on March 2, 2005 (70 FR 10298), and TSTF-449, Revision 4.

The repair processes in the current CR-3 Technical Specifications were specifically approved for the existing steam generators based on their history of operation, tube and tubesheet materials, and tube to tubesheet geometry. The analyses that form the basis for the approval of those repair processes are not applicable to the replacement OTSGs.

4.0 REGULATORY REQUIREMENTS AND GUIDANCE

The applicable regulatory requirements and guidance associated with this application are adequately addressed by the NRC Notice of Availability published on May 6, 2005 (70 FR 24126), the NRC Notice for Comment published on March 2, 2005 (70 FR 10298), and TSTF-449, Revision 4.

5.0 TECHNICAL ANALYSIS

Florida Power Corporation (FPC) has reviewed the safety evaluation published on March 2, 2005 (70 FR 10298) as part of the Consolidated Line Item Improvement Program (CLIIP) Notice for Comment. This included the NRC staff's Safety Evaluation (SE), the supporting information provided in TSTF-449, and the changes associated with Revision 4 to TSTF-449. FPC has concluded that the justifications presented in the TSTF proposal and the SE prepared by the NRC staff are applicable to CR-3 and justify this amendment for the incorporation of the changes to the CR-3 ITS, with one exception.

Stress analysis calculations are not complete to validate the tube plugging criterion that through-wall flaws of up to 40% are acceptable. Stress analyses determining the allowable through-wall flaw size are scheduled for completion in June 2008. FPC will provide verification that the correct tube plugging limit for CR-3 is 40% through-wall, or revise Technical Specification 5.6.2.10 to include the calculated tube plugging limit if less than 40% by September 30, 2008.

6.0 REGULATORY ANALYSIS

A description of this proposed change and its relationship to applicable regulatory requirements and guidance was provided in the NRC Notice of Availability published on May 6, 2005 (70 FR 24126), the NRC Notice for Comment published on March 2, 2005 (70 FR 10298), and TSTF-449, Revision 4.

6.1 Verification and Commitments

The following information is provided to support the NRC staff's review of this amendment application:

Plant Name, Unit No.	*Crystal River Unit 3*	
Steam Generator Model(s):	*CR-3 Replacement OTSG*	
Effective Full Power Years (EFPY) of service for currently installed OTSGs	*New at startup from Refueling Outage 16R*	
Tubing Material	*Alloy 690 TT (Thermally Treated)*	
Number of tubes per OTSG	*15,607*	
Number and percentage of tubes plugged in each OTSG	*OTSG A* *0 (0%) **	*OTSG B* *0 (0%) **
Number of Tubes repaired in each OTSG	*OTSG A* *N/A*	*OTSG B* *N/A*
Degradation mechanism(s) identified	- *None*	
Current primary-to-secondary leakage limits:	Per SG: *150 gallons per day (gpd) per LCO 3.4.12.d* Total: *No total limit specified in ITS* Temperature condition leakage is evaluated at: *room temperature*	
Approved Alternate Tube Repair Criteria (ARC):	- *None*	
Approved Replacement OTSG Tube Repair Methods	- *None*	
Performance criteria for accident leakage	- Primary to secondary leak rate values assumed in licensing basis accident analysis, including assumed temperature conditions: *1 gpm at accident temperature assumed in the CR-3 Final Safety Analysis Report.*	

* These are the nominal values for new generators; however, pre-service inspections may identify tubes with fabrication induced flaws that require plugging. The number of tubes requiring plugging is expected to be minimal and inconsequential.

7.0 NO SIGNIFICANT HAZARDS CONSIDERATION

FPC has reviewed the proposed no significant hazards consideration determination published on March 2, 2005 (70 FR 10298) as part of the CLIIP. FPC has concluded that the proposed determination presented in the notice is applicable to CR-3 and the determination is hereby incorporated by reference to satisfy the requirements of 10 CFR 50.91(a).

8.0 ENVIRONMENTAL EVALUATION

FPC has reviewed the environmental evaluation included in the model SE published on March 2, 2005 (70 FR 10298) as part of the CLIIP. FPC has concluded that the staff's findings presented in that evaluation are applicable to CR-3 and the evaluation is hereby incorporated by reference for this application.

9.0 PRECEDENT

This application is being made in accordance with the CLIIP. FPC is not proposing variations or deviations from the ITS changes described in TSTF-449, Revision 4, or the NRC staff's model SE published on March 2, 2005 (70 FR 10298).

10.0 REFERENCES

Federal Register Notices:

1. Notice for Comment published on March 2, 2005 (70 FR 10298)

2. Notice of Availability published on May 6, 2005 (70 FR 24126)

PROGRESS ENERGY FLORIDA, INC.

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 / LICENSE NUMBER DPR-72

LICENSE AMENDMENT REQUEST #298, Revision 0

Application to Modify Improved Technical Specifications For Replacement Steam Generators

ATTACHMENT B

Proposed Improved Technical Specification Changes (Mark-up)

~~Strikeout text~~ indicates deleted text.
Highlighted text indicates added text.

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.16 Steam Generator (OTSG) Tube Integrity

LCO 3.4.16 OTSG tube integrity shall be maintained.

AND

All OTSG tubes satisfying the tube repair criteria shall be plugged ~~or repaired~~ in accordance with the Steam Generator Program.

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

ACTIONS

---NOTE---
Separate Condition entry is allowed for each OTSG tube.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more OTSG tubes satisfying the tube repair criteria and not plugged ~~or repaired~~ in accordance with the Steam Generator Program.	A.1 Verify tube integrity of the affected tube(s) is maintained until the next refueling outage or OTSG tube inspection. AND A.2 Plug ~~or repair~~ the affected tube(s) in accordance with the Steam Generator Program.	7 days Prior to entering MODE 4 following the next refueling outage or OTSG tube inspection
B. Required Action and associated Completion Time of Condition A not met. OR OTSG tube integrity not maintained.	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.16.1	Verify OTSG tube integrity in accordance with the Steam Generator Program.	In accordance with the Steam Generator Program
SR 3.4.16.2	Verify that each inspected OTSG tube that satisfies the tube repair criteria is plugged ~~or repaired~~ in accordance with the Steam Generator Program.	Prior to entering MODE 4 following a OTSG tube inspection

5.6 Procedures, Programs and Manuals

5.6.2.10 Steam Generator (OTSG) Program

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

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 OTSG inspection outage, as determined from the inservice inspection results or by other means, prior to the plugging ~~or repair~~ of tubes. Condition monitoring assessments shall be conducted during each outage during which the OTSG tubes are inspected~~,~~ and plugged~~, or repaired~~ to confirm that the performance criteria are being met.

b. Performance criteria for OTSG tube integrity. OTSG 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 and 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.

(continued)

5.6 Procedures, Programs and Manuals

5.6.2.10 OTSG Program (continued)

2. Accident induced leakage performance criterion: The primary to secondary accident induced leakage rate for any design basis accident, other than an OTSG tube rupture, shall not exceed the leakage rate assumed in the accident analysis in terms of total leakage rate for all OTSGs and leakage rate for an individual OTSG. Leakage is not to exceed one gallon per minute per OTSG.

3. The operational LEAKAGE performance criterion is specified in LCO 3.4.12, "RCS Operational LEAKAGE."

c. Provisions for OTSG tube repair criteria. ~~Tubes shall be plugged if the sleeved region of a tube is found by inservice inspection to contain flaws in the (a) sleeve or (b) the pressure boundary portion of the original tube wall in the sleeve/tube assembly.~~

~~The non-sleeved region of a~~ A tube found by inservice inspection to contain flaws with a depth equal to or exceeding 40% of the nominal tube wall thickness shall be plugged~~, or repaired except if the flaws are permitted to remain in service through application of an alternate tube repair criteria discussed below.~~

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

~~1. Pit-like Intergranular Attack (IGA) indication means a bobbin coil indication confirmed by Motorized Rotating Pancake Coil (MRPC) or other qualified inspection techniques to have a volumetric, pit-like morphology characteristic of IGA. Inservice tubes with pit-like IGA indications in the first span of the B OTSG are acceptable provided the depth of the indication is less than 40% of the nominal tube wall thickness. Inservice tubes with pit-like IGA indications in the first span of the B OTSG with a depth equal to or exceeding 40% of the nominal tube wall thickness shall be plugged.~~

(continued)

~~5.6 Procedures, Programs and Manuals~~

~~5.6.2.10 OTSG Program (continued)~~

~~2. Tube End Cracks (TEC) are those crack-like eddy current indications, circumferentially and/or axially oriented, that are within the Inconel clad region of the primary face of the upper and lower tubesheets, but do not extend into the carbon steel-to Inconel clad interface. Tubes with axially oriented TEC may be left in-service using the method described in Topical Report BAW-2346P, Revision 0, provided the combined projected leakage from all sources of primary-to-secondary leakage, including axial TEC indications left in-service, does not exceed the Main Steam Line Break (MSLB) accident leakage limit of one gallon per minute, minus 150 gallons per day, per OTSG. The contribution to MSLB leakage rates from TEC indications shall be determined utilizing the methodology in Addendum B dated August 10, 2005 to Topical Report BAW-2346P, Revision 0. The projection of TEC leakage that may develop during the next operating cycle shall be determined using the methodology in Addendum C dated August 30, 2005 to Topical Report BAW-2346P, Revision 0.~~

~~Tubes identified with TEC that are allowed to remain in service under the alternate repair criteria will be added to the existing list of tubes in the OTSG Inservice Inspection Surveillance Procedure. The inspection data for tubes with axially oriented TEC indications shall be compared to the previous inspection data to monitor the indications for growth.~~

~~Tubes with crack-like indications within the carbon steel portion of the tubesheet, circumferentially oriented TEC, or volumetric indications within the Inconel clad region of the tubesheet shall be repaired using the appropriate method from 5.6.2.10.f or removed from service by plugging the tube.~~

(continued)

5.6 Procedures, Programs and Manuals

5.6.2.10 OTSG Program (continued)

d. Provisions for OTSG tube inspections. Periodic OTSG 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 repair criteria. The tube-to-tubesheet weld is not part of the tube. ~~In tubes repaired by sleeving, the portion of the original tube wall between the sleeve's joints is not an area requiring re-inspection.~~ In addition to meeting the requirements of d.1 through d.8[3] below, the inspection scope, inspection methods, and inspection intervals shall be such as to ensure that OTSG tube integrity is maintained until the next OTSG 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.

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

2. Inspect 100% of the tubes at sequential periods of [144, 108, 72, and, thereafter,] 60 effective full power months. The first sequential period shall be considered to begin after the first inservice inspection of the OTSGs. [In addition, inspect 50% of the tubes by the refueling outage nearest the midpoint of the period and the remaining 50% by the refueling outage nearest the end of the period.] No OTSG shall operate for more than ~~24~~ [72] effective full power months or ~~one~~ [three] refueling outage[s] (whichever is less) without being inspected.

3. If crack indications are found in any OTSG tube, then the next inspection for each OTSG 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.

(continued)

~~5.6 Procedures, Programs and Manuals~~

~~5.6.2.10 OTSG Program (continued)~~

~~4. Inservice tubes with pit-like IGA indications in the first span of the B OTSG must be inspected with bobbin and Motorized Rotating Pancake Coil (MRPC) eddy current techniques from the lower tube sheet secondary face to the bottom of the first tube support plate during each inservice inspection of the B OTSG.~~

~~Inservice tubes with pit-like IGA indications in the "B" OTSG first span shall be monitored for growth of these indications by using a test probe equivalent to the high frequency bobbin probe used in the 1997 inspection. The indicated percentage through-wall value from the current inspection shall be compared to the indicated percentage through-wall value from the 1997 inspection.~~

~~5. Tubes in-service with axially oriented tube end cracks (TEC) are identified in the OTSG Inservice Inspection Surveillance Procedure. The portion of the tube with the axial TEC must be inspected using the motorized rotating coil eddy current technique every 24 effective full power months or one refueling outage, whichever is less.~~

~~6. If the plant is required to shut down due to primary-to-secondary leakage and the cause is determined to be degradation of the TEC portion of the tubes, 100% of the tubes with TEC in that OTSG shall be examined in the location of the TEC. If more than 1% of the examined tubes satisfy the tube repair criteria, 100% of the tubes with TEC in the other OTSG shall be examined in the location of the TEC.~~

~~7. The repair roll in each tube will be inspected every 24 effective full power months or one refueling outage (whichever is less) while the tube with a repair roll is in service.~~

~~8. If the plant is required to shut down due to primary-to-secondary leakage and the cause is determined to be a flaw in a repair roll, 100% of the repair rolls in both OTSGs shall be examined.~~

(continued)

5.6 Procedures, Programs and Manuals

5.6.2.10 OTSG Program (continued)

e. Provisions for monitoring operational primary to secondary LEAKAGE.

~~f. Provisions for OTSG tube repair methods. Steam generator tube repair methods shall provide the means to reestablish the RCS pressure boundary integrity of OTSG tubes without removing the tube from service. For the purposes of these Specifications, tube plugging is not a repair. All acceptable tube repair methods are listed below.~~

~~1. Sleeve installation in accordance with the B&W process (or method) described in report BAW-2120P. No more than five thousand sleeves may be installed in each OTSG.~~

~~2. Installation of repair rolls in the upper and lower tubesheets in accordance with BAW-2303P, Revision 4. The repair process (single, overlapping, or multiple roll) may be performed in each tube. The repair roll area will be examined using eddy-current methods following installation. The repair roll must be free of flaws for the repair to be considered acceptable. If the repair roll is unacceptable, the tube must be repaired or plugged.~~

5.7 Reporting Requirements

5.7.2 Special Reports (continued)

5. Number of tubes plugged ~~or repaired~~ during the inspection outage for each active degradation mechanism,

6. Total number and percentage of tubes plugged ~~or repaired~~ to date,

7. The results of condition monitoring, including the results of tube pulls and in-situ testing,

8. The effective plugging percentage for all plugging ~~and tube repairs~~ in each OTSG~~,~~.

~~9. Repair method utilized and the number of tubes repaired by each repair method,~~

~~10. Location, bobbin coil amplitude, and axial and circumferential extent (if determined) for each first span IGA indication, and an assessment of growth for indications in the first span of OTSG B, and~~

~~11. Number of as-found and as-left tubes with TEC indications, number of as-found and as-left TEC indications, the number of as-found and as-left TEC indications as a function of tubesheet radius, the as-found, as-left, probability of detection and new TEC leakage for upper and lower tubesheet indications. The projected accident leakage and an assessment of growth for TEC indications will be provided. An assessment of the adequacy of the predictive methodology in Addendum C to Topical Report BAW-2346P, Revision 0, including assessing the distribution of indications found in each OTSG to ensure the assumption regarding the similarity of the distribution of indications remain consistent from one cycle to the next and that the assumption of a linear increase in leak rate remain valid. Corrective actions in the event that the assessment indicates the assumptions can not be fully supported.~~

PROGRESS ENERGY FLORIDA, INC.

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 / LICENSE NUMBER DPR-72

LICENSE AMENDMENT REQUEST #298, Revision 0

Application to Modify Improved Technical Specifications For Replacement Steam Generators

ATTACHMENT C

Proposed Improved Technical Specification Changes (Revision Bar Format)

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.16 Steam Generator (OTSG) Tube Integrity

LCO 3.4.16 OTSG tube integrity shall be maintained.

AND

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

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

ACTIONS

NOTE

Separate Condition entry is allowed for each OTSG tube.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more OTSG tubes satisfying the tube repair criteria and not plugged in accordance with the Steam Generator Program.	A.1 Verify tube integrity of the affected tube(s) is maintained until the next refueling outage or OTSG tube inspection. AND A.2 Plug the affected tube(s) in accordance with the Steam Generator Program.	7 days Prior to entering MODE 4 following the next refueling outage or OTSG tube inspection
B. Required Action and associated Completion Time of Condition A not met. OR OTSG tube integrity not maintained.	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.16.1	Verify OTSG tube integrity in accordance with the Steam Generator Program.	In accordance with the Steam Generator Program
SR 3.4.16.2	Verify that each inspected OTSG tube that satisfies the tube repair criteria is plugged in accordance with the Steam Generator Program.	Prior to entering MODE 4 following a OTSG tube inspection

5.6 Procedures, Programs and Manuals

5.6.2.10 Steam Generator (OTSG) Program

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

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 OTSG 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 OTSG tubes are inspected and plugged to confirm that the performance criteria are being met.

b. Performance criteria for OTSG tube integrity. OTSG 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 and 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.

(continued)

5.6 Procedures, Programs and Manuals

5.6.2.10 OTSG Program (continued)

2. Accident induced leakage performance criterion: The primary to secondary accident induced leakage rate for any design basis accident, other than an OTSG tube rupture, shall not exceed the leakage rate assumed in the accident analysis in terms of total leakage rate for all OTSGs and leakage rate for an individual OTSG. Leakage is not to exceed one gallon per minute per OTSG.

3. The operational LEAKAGE performance criterion is specified in LCO 3.4.12, "RCS Operational LEAKAGE."

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

d. Provisions for OTSG tube inspections. Periodic OTSG 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 repair criteria. The tube-to-tubesheet weld is not part of the tube. In addition to meeting the requirements of d.1 through d.3 below, the inspection scope, inspection methods, and inspection intervals shall be such as to ensure that OTSG tube integrity is maintained until the next OTSG 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.

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

2. Inspect 100% of the tubes at sequential periods of 144, 108, 72, and, thereafter, 60 effective full power months. The first sequential period shall be considered to begin after the first inservice inspection of the OTSGs. In addition, inspect 50% of the tubes by the refueling outage nearest the midpoint

(continued)

5.6.2.10 OTSG Program (continued)

of the period and the remaining 50% by the refueling outage nearest the end of the period. No OTSG shall operate for more than 72 effective full power months or three refueling outages (whichever is less) without being inspected.

3. If crack indications are found in any OTSG tube, then the next inspection for each OTSG 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.

e. Provisions for monitoring operational primary to secondary LEAK

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5.7 Reporting Requirements

5.7.2 Special Reports (continued)

5. Number of tubes plugged during the inspection outage for each active degradation mechanism,

6. Total number and percentage of tubes plugged to date,

7. The results of condition monitoring, including the results of tube pulls and in-situ testing,

8. The effective plugging percentage for all plugging in each OTSG.

PROGRESS ENERGY FLORIDA, INC.

CRYSTAL RIVER UNIT 3

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Application to Modify Improved Technical Specifications For Replacement Steam Generators

ATTACHMENT D

Proposed Improved Technical Specification Bases Pages (Mark-up)

~~Strikeout text~~ indicates deleted text.
Highlighted text indicates added text.

BASES

BACKGROUND (continued)

performance criteria are described in Specification 5.6.2.10. Meeting the OTSG performance criteria provides reasonable assurance of maintaining tube integrity at normal and accident conditions.

The processes used to meet the OTSG performance criteria are defined by the Steam Generator Program Guidelines (Ref. 1).

APPLICABLE SAFETY ANALYSES

The steam generator tube rupture (SGTR) accident is the limiting design basis event for OTSG tubes and avoiding an SGTR is the basis for this Specification. The analysis of a SGTR event assumes a bounding primary to secondary LEAKAGE rate equal to the operational LEAKAGE rate limits in LCO 3.4.12, "RCS Operational LEAKAGE," plus the leakage rate associated with a double-ended rupture of a single tube. The accident analysis for a SGTR assumes the contaminated secondary fluid is only briefly released to the atmosphere via safety valves and the majority is discharged to the main condenser.

The analysis for design basis accidents and transients other than a SGTR assume the OTSG tubes retain their structural integrity (i.e., they are assumed not to rupture). In these analyses, the steam discharge to the atmosphere is based on the total primary to secondary LEAKAGE from all OTSGs of one gallon per minute or is assumed to increase to one gallon per minute as a result of accident induced conditions. For accidents that do not involve fuel damage, the primary coolant activity level of DOSE EQUIVALENT I-131 is assumed to be equal to the LCO 3.4.15, "RCS Specific Activity," limits. For accidents that assume fuel damage, the primary coolant activity is a function of the amount of activity released from the damaged fuel. The dose consequences of these events are within the limits of GDC 19 (Ref. 2), 10 CFR 50.67 (Ref. 3) or the NRC approved licensing bases (e.g., a small fraction of these limits).

Steam generator tube integrity satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

The LCO requires that OTSG tube integrity be maintained. The LCO also requires that all OTSG tubes that satisfy the repair criteria be plugged ~~or repaired~~ in accordance with the Steam Generator Program.

(continued)

BASES

LCO (continued)

During an OTSG inspection, any inspected tube that satisfies the Steam Generator Program repair criteria is ~~repaired or~~ removed from service by plugging. If a tube was determined to satisfy the repair criteria but was not plugged ~~or repaired~~, the tube may still have tube integrity.

In the context of this Specification, an OTSG tube is defined as the entire length of the tube, including the tube wall ~~and any repairs made to it~~, between the tube-to-tubesheet weld at the tube inlet and the tube-to-tubesheet weld at the tube outlet. The tube-to-tubesheet weld is not considered part of the tube.

An OTSG tube has tube integrity when it satisfies the OTSG performance criteria. The OTSG performance criteria are defined in Specification 5.6.2.10, "Steam Generator Program," and describe acceptable OTSG tube performance. The Steam Generator Program also provides the evaluation process for determining conformance with the OTSG performance criteria.

There are three OTSG performance criteria: structural integrity, accident induced leakage, and operational LEAKAGE. Failure to meet any one of these criteria is considered failure to meet the LCO.

The structural integrity performance criterion provides a margin of safety against tube burst or collapse under normal and accident conditions, and ensures structural integrity of the OTSG tubes under all anticipated transients included in the design specification. Tube burst is defined as, "The gross structural failure of the tube wall. The condition typically corresponds to an unstable opening displacement (e.g., opening area increased in response to constant pressure) accompanied by ductile (plastic) tearing of the tube material at the ends of the degradation." Tube collapse is defined as, "For the load displacement curve for a given structure, collapse occurs at the top of the load versus displacement curve where the slope of the curve becomes zero." The structural integrity performance criterion provides guidance on assessing loads that have a significant effect on burst or collapse. In that context, the term "significant" is defined as "An accident loading condition other than differential pressure

(continued)

BASES

APPLICABILITY

Steam generator tube integrity is challenged when the pressure differential across the tubes is large. Large differential pressures across OTSG tubes can only be experienced in MODE 1, 2, 3, or 4.

RCS conditions are far less challenging in MODES 5 and 6 than during MODES 1, 2, 3, and 4. In MODES 5 and 6, primary to secondary differential pressure is low, resulting in lower stresses and reduced potential for LEAKAGE.

ACTIONS

The ACTIONS are modified by a Note clarifying that the Conditions may be entered independently for each OTSG tube. This is acceptable because the Required Actions provide appropriate compensatory actions for each affected OTSG tube. Complying with the Required Actions may allow for continued operation, and subsequent affected OTSG tubes are governed by subsequent Condition entry and application of associated Required Actions.

A.1 and A.2

Condition A applies if it is discovered that one or more OTSG tubes examined in an inservice inspection satisfy the tube repair criteria but were not plugged ~~or repaired~~ in accordance with the Steam Generator Program as required by SR 3.4.16.2. An evaluation of OTSG tube integrity of the affected tube(s) must be made. Steam generator tube integrity is based on meeting the OTSG performance criteria described in the Steam Generator Program. The OTSG repair criteria define limits on OTSG tube degradation that allow for flaw growth between inspections while still providing assurance that the OTSG performance criteria will continue to be met. In order to determine if an OTSG tube that should have been plugged ~~or repaired~~ has tube integrity, an evaluation must be completed that demonstrates that the OTSG performance criteria will continue to be met until the next refueling outage or OTSG tube inspection. The tube integrity determination is based on the estimated condition of the tube at the time the situation is discovered and the estimated growth of the degradation prior to the next OTSG tube inspection. If it is determined that tube integrity is not being maintained, Condition B applies.

(continued)

BASES

ACTIONS

A.1 and A.2 (continued)

A Completion Time of 7 days is sufficient to complete the evaluation while minimizing the risk of plant operation with an OTSG tube that may not have tube integrity.

If the evaluation determines that the affected tube(s) have tube integrity, Required Action A.2 allows plant operation to continue until the next refueling outage or OTSG inspection provided the inspection interval continues to be supported by an operational assessment that reflects the affected tubes. However, the affected tube(s) must be plugged ~~or repaired~~ prior to entering MODE 4 following the next refueling outage or OTSG inspection. This Completion Time is acceptable since operation until the next inspection is supported by the operational assessment.

B.1 and B.2

If the Required Actions and associated Completion Times of Condition A are not met or if OTSG tube integrity is not being maintained, the reactor must be brought to MODE 3 within 6 hours and MODE 5 within 36 hours.

The allowed Completion Times are reasonable, based on operating experience, to reach the desired plant conditions from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.4.16.1

During shutdown periods the OTSGs are inspected as required by this SR and the Steam Generator Program. NEI 97-06, Steam Generator Program Guidelines (Ref. 1), and its referenced EPRI Guidelines, establish the content of the Steam Generator Program. Use of the Steam Generator Program ensures that the inspection is appropriate and consistent with accepted industry practices.

During OTSG inspections a condition monitoring assessment of the OTSG tubes is performed. The condition monitoring assessment determines the "as found" condition of the OTSG tubes. The purpose of the condition monitoring assessment is to ensure that the OTSG performance criteria have been met for the previous operating period.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.16.1 (continued)

The Steam Generator Program determines the scope of the inspection and the methods used to determine whether the tubes contain flaws satisfying the tube repair criteria. Inspection scope (i.e., which tubes or areas of tubing within the OTSG are to be inspected) is a function of existing and potential degradation locations. The Steam Generator Program also specifies the inspection methods to be used to find potential degradation. Inspection methods are a function of degradation morphology, non-destructive examination (NDE) technique capabilities, and inspection locations.

The Steam Generator Program defines the Frequency of SR 3.4.16.1. The Frequency is determined by the operational assessment and other limits in the OTSG examination guidelines (Ref. 6). The Steam Generator Program uses information on existing degradations and growth rates to determine an inspection Frequency that provides reasonable assurance that the tubing will meet the OTSG performance criteria at the next scheduled inspection. In addition, Specification 5.6.2.10 contains prescriptive requirements concerning inspection intervals to provide added assurance that the OTSG performance criteria will be met between scheduled inspections.

SR 3.4.16.2

During an OTSG inspection, any inspected tube that satisfies the Steam Generator Program repair criteria is ~~repaired or~~ removed from service by plugging. The tube repair criteria delineated in Specification 5.6.2.10 are intended to ensure that tubes accepted for continued service satisfy the OTSG performance criteria with allowance for error in the flaw size measurement and for future flaw growth. In addition, the tube repair criteria, in conjunction with other elements of the Steam Generator Program, ensure that the OTSG performance criteria will continue to be met until the next inspection of the subject tube(s). Reference 1 provides guidance for performing operational assessments to verify that the tubes remaining in service will continue to meet the OTSG performance criteria.

~~Steam generator tube repairs are only performed using approved repair methods as described in the Steam Generator Program.~~

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.16.2 (continued)

The Frequency of prior to entering MODE 4 following a OTSG inspection ensures that the Surveillance has been completed and all tubes meeting the repair criteria are plugged ~~or repaired~~ prior to subjecting the OTSG tubes to significant primary to secondary pressure differential.

REFERENCES

1. NEI 97-06, "Steam Generator Program Guidelines."

2. 10 CFR 50 Appendix A, GDC 19.

3. 10 CFR 50.67.

4. ASME Boiler and Pressure Vessel Code, Section III, Subsection NB.

5. Draft Regulatory Guide 1.121, "Basis for Plugging Degraded Steam Generator Tubes," August 1976.

6. EPRI, "Pressurized Water Reactor Steam Generator Examination Guidelines."

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ATTACHMENT E

Proposed Improved Technical Specification Bases Pages (Revision Bar Format)

BASES

BACKGROUND (continued)

performance criteria are described in Specification 5.6.2.10. Meeting the OTSG performance criteria provides reasonable assurance of maintaining tube integrity at normal and accident conditions.

The processes used to meet the OTSG performance criteria are defined by the Steam Generator Program Guidelines (Ref. 1).

APPLICABLE SAFETY ANALYSES

The steam generator tube rupture (SGTR) accident is the limiting design basis event for OTSG tubes and avoiding an SGTR is the basis for this Specification. The analysis of a SGTR event assumes a bounding primary to secondary LEAKAGE rate equal to the operational LEAKAGE rate limits in LCO 3.4.12, "RCS Operational LEAKAGE," plus the leakage rate associated with a double-ended rupture of a single tube. The accident analysis for a SGTR assumes the contaminated secondary fluid is only briefly released to the atmosphere via safety valves and the majority is discharged to the main condenser.

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Steam generator tube integrity satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

The LCO requires that OTSG tube integrity be maintained. The LCO also requires that all OTSG tubes that satisfy the repair criteria be plugged in accordance with the Steam Generator Program.

(continued)

BASES

LCO (continued)

During an OTSG inspection, any inspected tube that satisfies the Steam Generator Program repair criteria is removed from service by plugging. If a tube was determined to satisfy the repair criteria but was not plugged, the tube may still have tube integrity.

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BASES

APPLICABILITY

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A.1 and A.2

Condition A applies if it is discovered that one or more OTSG tubes examined in an inservice inspection satisfy the tube repair criteria but were not plugged in accordance with the Steam Generator Program as required by SR 3.4.16.2. An evaluation of OTSG tube integrity of the affected tube(s) must be made. Steam generator tube integrity is based on meeting the OTSG performance criteria described in the Steam Generator Program. The OTSG repair criteria define limits on OTSG tube degradation that allow for flaw growth between inspections while still providing assurance that the OTSG performance criteria will continue to be met. In order to determine if an OTSG tube that should have been plugged has tube integrity, an evaluation must be completed that demonstrates that the OTSG performance criteria will continue to be met until the next refueling outage or OTSG tube inspection. The tube integrity determination is based on the estimated condition of the tube at the time the situation is discovered and the estimated growth of the degradation prior to the next OTSG tube inspection. If it is determined that tube integrity is not being maintained, Condition B applies.

(continued)

BASES

ACTIONS

A.1 and A.2 (continued)

A Completion Time of 7 days is sufficient to complete the evaluation while minimizing the risk of plant operation with an OTSG tube that may not have tube integrity.

If the evaluation determines that the affected tube(s) have tube integrity, Required Action A.2 allows plant operation to continue until the next refueling outage or OTSG inspection provided the inspection interval continues to be supported by an operational assessment that reflects the affected tubes. However, the affected tube(s) must be plugged prior to entering MODE 4 following the next refueling outage or OTSG inspection. This Completion Time is acceptable since operation until the next inspection is supported by the operational assessment.

B.1 and B.2

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SURVEILLANCE REQUIREMENTS

SR 3.4.16.1

During shutdown periods the OTSGs are inspected as required by this SR and the Steam Generator Program. NEI 97-06, Steam Generator Program Guidelines (Ref. 1), and its referenced EPRI Guidelines, establish the content of the Steam Generator Program. Use of the Steam Generator Program ensures that the inspection is appropriate and consistent with accepted industry practices.

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(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.16.1 (continued)

The Steam Generator Program determines the scope of the inspection and the methods used to determine whether the tubes contain flaws satisfying the tube repair criteria. Inspection scope (i.e., which tubes or areas of tubing within the OTSG are to be inspected) is a function of existing and potential degradation locations. The Steam Generator Program also specifies the inspection methods to be used to find potential degradation. Inspection methods are a function of degradation morphology, non-destructive examination (NDE) technique capabilities, and inspection locations.

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SR 3.4.16.2

During an OTSG inspection, any inspected tube that satisfies the Steam Generator Program repair criteria is repaired or removed from service by plugging. The tube repair criteria delineated in Specification 5.6.2.10 are intended to ensure that tubes accepted for continued service satisfy the OTSG performance criteria with allowance for error in the flaw size measurement and for future flaw growth. In addition, the tube repair criteria, in conjunction with other elements of the Steam Generator Program, ensure that the OTSG performance criteria will continue to be met until the next inspection of the subject tube(s). Reference 1 provides guidance for performing operational assessments to verify that the tubes remaining in service will continue to meet the OTSG performance criteria.

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BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.16.2 (continued)

The Frequency of prior to entering MODE 4 following a OTSG inspection ensures that the Surveillance has been completed and all tubes meeting the repair criteria are plugged prior to subjecting the OTSG tubes to significant primary to secondary pressure differential.

REFERENCES

1. NEI 97-06, "Steam Generator Program Guidelines."

2. 10 CFR 50 Appendix A, GDC 19.

3. 10 CFR 50.67.

4. ASME Boiler and Pressure Vessel Code, Section III, Subsection NB.

5. Draft Regulatory Guide 1.121, "Basis for Plugging Degraded Steam Generator Tubes," August 1976.

6. EPRI, "Pressurized Water Reactor Steam Generator Examination Guidelines."

List of Regulatory Commitments

The following table identifies those actions committed to by Florida Power Corporation (FPC) in this document. Any other actions discussed in the submittal represent intended or planned actions by FPC. They are described to the NRC for the NRC's information and are not regulatory commitments. Please notify the Supervisor, Licensing and Regulatory Programs of any questions regarding this document or any associated regulatory commitments.

Commitment	Due Date
FPC will provide verification that the correct tube plugging limit for CR-3 is 40% through-wall, or revise Technical Specification 5.6.2.10 to include the calculated tube plugging limit if less than 40%.	September 30, 2008