

# Florida Power

CORPORATION  
Crystal River Unit 3  
Docket No. 50-302

May 31, 1995  
3F0595-05

U. S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, D.C. 20555

Subject: Confirmatory Action Letter No. 2-94-004, Item No. 9  
Technical Specification Change Request No. 203, Revision 0

Reference: A. NRC to FPC letter, 3N0494-21, dated April 26, 1994  
B. FPC to NRC letter, 3F0594-01, dated May 25, 1994  
C. FPC to NRC letter, 3F1194-10, dated November 30, 1994  
D. FPC to NRC letter, 3F0494-09, dated April 19, 1994

Dear Sir:

Florida Power Corporation (FPC) hereby submits Technical Specification Change Request No. (TSCRN) 203 requesting amendment to Operating License No. DPR-72. As part of this request, the TSCRN and the proposed replacement pages are provided. Also, provided as Attachment 1, is a report containing the technical basis for the proposed license amendment.

The TSCRN proposes an alternate methodology for dispositioning small volume eddy current indications present in the Crystal River Unit Three (CR-3) Once Through Steam Generators' (OTSG) tubes. The submittal of this TSCRN fulfills the Confirmatory Action Letter (Reference A), Item No. 9, to "Provide a proposed License Amendment based on your evaluation of the tube pull data no later than May 31, 1995." FPC provided the information necessary to close Items 1 through 8 in References B and C.

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*Appl*

FPC is submitting an affidavit with Attachment 1, requesting the technical report titled "Alternate Disposition Strategy for Low Volume OTSG Eddy Current Indications" be withheld from public disclosure on the grounds that the analysis contains information proprietary to FPC. The affidavit is provided in accordance with 10 CFR 2.790 (b)(1). A non-proprietary version of the technical report will be submitted under separate cover. The "Evaluation of Request" summarizes the technical report's conclusions in such a manner as to facilitate public understanding and involvement.

The proposed disposition strategy is essentially an alternate steam generator tube repair criteria. However, it differs from other industry efforts ongoing with recirculating steam generators (RSGs). The fundamental differences between the CR-3 strategy contained in this license amendment and the RSGs Alternate Plugging Criteria (APC), are as follows:

The criteria is morphology-specific, not degradation-specific. It addresses volumetric-type low S/N eddy current indications (excluding those located in the tubesheet regions). It addresses both wear and IGA degradation mechanisms.

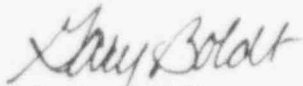
Crack-like eddy current indications are not included within the scope of the proposed TSCRN. CR-3 operating experience and pulled tube data has shown no evidence of these indications outside the lane/wedge region. In this region, susceptible to circumferential cracking, FPC has preventively sleeved tubes in both steam generators.

No leaking or through-wall (TW) defects are involved. Operational leakage for CR-3 is essentially zero. Pulled tube results indicate signal-to-noise (S/N) defects retain more than the minimum ligament shown to be necessary to ensure no tube leakage under worst-case accident conditions.

Studies performed to assess growth rate of S/N indications present in CR-3 tubes have shown essentially no growth.

FPC recommends a meeting with the NRC staff to further discuss our proposal. FPC is requesting an amendment for this change request be issued by October 1995 to allow enough time to revise inspection procedures and complete analyst training prior to the next OTSG inspection scheduled for February, 1996.

Sincerely,



G. L. Boldt,  
Vice President  
Nuclear Production

GLB/LVC

Attachment

xc: Regional Administrator, Region II  
Senior Resident Inspector  
NRR Project Manager  
NEI Steam Generator Lead - w/o attachment

STATE OF FLORIDA

COUNTY OF CITRUS

G. L. Boldt, states that he is the Vice President, Nuclear Production for Florida Power Corporation; 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.

G. L. Boldt

G. L. Boldt,  
Vice President  
Nuclear Production

Subscribed and sworn to before me, a Notary Public in and for the State and County above named, this 31st day of May, 1995.

JOAN BUFE CARR

Notary Public (print)

Joan BuFe Carr

Notary Public (signature)

Notary Public, State of Florida at Large,

My Commission Expires: 6-21-95



NOTARY PUBLIC, STATE OF FLORIDA.  
MY COMMISSION EXPIRES: June 21, 1995.  
BONDED THRU NOTARY PUBLIC UNDERWRITERS.

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

IN THE MATTER )  
 )  
FLORIDA POWER CORPORATION ) DOCKET NO. 50-302

CERTIFICATE OF SERVICE

G. L. Boldt deposes and says that the following has been served on the Designated State Representative and Chief Executive of Citrus County, Florida, by deposit in the United States mail, addressed as follows:

Chairman,  
Board of County Commissioners  
of Citrus County  
Citrus County Courthouse  
Inverness, FL 34450

Administrator,  
Radiological Health Services  
Department of Health and  
Rehabilitative Services  
1323 Winewood Blvd.  
Tallahassee, FL 32301

A copy of Technical Specification Change Request No. 203, Revision 0.

FLORIDA POWER CORPORATION

G.L. Boldt  
G.L. Boldt  
Vice President  
Nuclear Production

SWORN TO AND SUBSCRIBED BEFORE ME THIS 31st DAY OF MAY, 1995

JOAN BUFE CARR  
Notary Public (print)

Notary Public, State of Florida at Large  
My Commission Expires: 6-21-95

Joan Bufo Carr  
Notary Public (signature)

NOTARY PUBLIC, STATE OF FLORIDA.  
MY COMMISSION EXPIRES: June 21, 1995.  
BONDED THRU NOTARY PUBLIC UNDERWRITERS.

FLORIDA POWER CORPORATION  
CRYSTAL RIVER UNIT 3  
DOCKET NO. 50-302/LICENSE NO. DPR-72  
TECHNICAL SPECIFICATION CHANGE REQUEST NO. 203, REVISION 0  
SMALL VOLUME OTSG EDDY CURRENT INDICATION DISPOSITION

LICENSE DOCUMENT INVOLVED: Technical Specifications (TS)

PORTIONS: Technical Specification 5.6.2.10  
Technical Specification 5.7.2.c

DESCRIPTION OF REQUEST:

This request proposes an alternate methodology for dispositioning small volume Once Through Steam Generator (OTSG) tube eddy current indications. The alternate methodology utilizes acceptance criteria based upon the indications' signal-to-noise ratio, morphology, bobbin coil amplitude, and axial and circumferential dimensions as opposed to the current percent through-wall criteria. The proposed alternate criteria is described below.

Indications with a bobbin coil signal-to-noise ratio of  $\leq 5:1$  and a bobbin coil amplitude between 0.9 and 2.5 volts will undergo an initial motorized rotating pancake coil (MRPC) inspection to determine the morphology of the indication. Indications exhibiting a volumetric morphology will undergo an MRPC sizing evaluation to determine axial and circumferential extent. All other morphologies will be dispositioned in accordance with current Technical Specification inspection practices. Volumetric indications with:

- a bobbin coil signal-to-noise ratio of  $\leq 5:1$ ;
- a bobbin coil amplitude  $< 2.5$  volts;
- axial extent  $\leq 0.33$  inches; and
- circumferential extent  $\leq 0.6$  inches will remain in service.

Following an initial MRPC examination of the indication, subsequent MRPC examination is not required unless bobbin coil amplitude increases by a value of 0.5 volts. Indications with a bobbin coil signal-to-noise ratio of  $> 5:1$  and all indications within either tubesheet will continue to be sized using the "phase angle" method. The repair limit for these indications is 40% of the nominal tube wall thickness. The alternate criteria is proposed to apply to both OTSGs.

The following specific changes to the Technical Specifications are proposed to address the criteria described above.

- A. 5.6.2.10.2, page 5.0-14, first full paragraph; propose to add the words "bobbin coil" prior to "sample inspection" such that this sentence would read as follows:

The results of each bobbin coil sample inspection shall be classified into one of the following three categories:

- B. 5.6.2.10.2, page 5.0-14, Note modifying category definition; propose to insert criteria reflective of growth in a signal-to-noise (S/N) indication. The proposed Note would read as follows:

In all inspections, previously degraded tubes whose degradation has not been spanned by a sleeve must exhibit a significant increase in the applicable imperfection size measurement ( $> +0.5V$  bobbin coil amplitude increase for S/N indications or  $>10\%$  further wall penetration for all other imperfections) to be included in the below percentage calculations.

- C. 5.6.2.10.4.a.2, page 5.0-16, second and third sentence; Add S/N imperfection criteria such that these sentences would read as follows:

S/N indications with a bobbin coil amplitude  $< 0.9V$  are considered imperfections. Other eddy current testing indications below 20% of the nominal tube wall thickness, if detectable, may also be considered as imperfections.

- D. 5.6.2.10.4.a.4, page 5.0-16, first sentence; Add S/N criteria equating to a degraded tube such that this sentence would read as follows:

Degraded Tube means a tube containing a S/N indication with a bobbin coil amplitude  $\geq 0.9V$  or other imperfection  $\geq 20\%$  of the nominal wall thickness caused by degradation except where all such degradation has been spanned by the installation of a sleeve.

- E. 5.6.2.10.4.a, add page 5.0-16A, new vocabulary term; Add new vocabulary term for S/N indication as 5.6.2.10.4.a.7 such that the TS would read as follows:

Signal-to-Noise (S/N) indication means an indication whose associated bobbin coil amplitude is  $< 5$  times the background noise, excluding indications located in the tube sheet regions or indications determined to be other than a volumetric morphology.

- F. 5.6.2.10.4.a.7 and 8 on added page 5.0-16A, and 5.6.2.10.4.a.9, page 5.0-17; Renumber definitions to reflect insertion of new S/N indication vocabulary term.

- G. 5.6.2.10.4.a.7, renumbered to 5.6.2.10.4.a.8, on added page 5.0-16A; Add S/N criteria equating to the plugging/ sleeving limit such that this definition would read as follows:

Plugging/Sleeving Limit means the imperfection depth at or beyond which the tube shall be restored to serviceability by the installation of a sleeve or removed from service because it may become unserviceable prior to the next inspection. The Limit for S/N indications is equal to a bobbin coil amplitude of  $2.5V$ , an axial extent of  $0.33$  inches, or a circumferential extent of  $0.6$  inches. The Limit is equal to  $40\%$  of the nominal tube or sleeve wall thickness for other imperfections. No more than  $5000$  sleeves may be installed in each OTSG.



- H. 5.7.2.c.2, page 5.0-29; Add reporting requirements for S/N indications such that this section would read as follows:

Location, bobbin coil amplitude, and axial and circumferential extent (if determined) for each S/N indication and the location and percent of wall thickness penetration for each other indication of an imperfection, and

#### **REASON FOR REQUEST:**

Current Once Through Steam Generator (OTSG) TS inspection acceptance criteria are depth-based or percent through-wall (TW) criteria. TS specify the plugging/sleeving limit (i.e., repair limit) used as the criteria for removing steam generator tubes from service to be an imperfection depth equal to or greater than 40% of the nominal wall thickness. This criteria is based on a structural evaluation of a simplified model of tubes with uniform wall thinning. However, based upon CR-3 pulled tube examination results, the degradation observed in the CR-3 pulled tubes has a substantially different morphology than the model used to develop the current limit. Extrapolation of the pulled tube results to the balance of CR-3 inservice indications is justified based upon eddy current field experience and laboratory results.

During previous eddy current inspections, a significant number of small volume indications were identified. Due to the small signal amplitude associated with these indications, they can not be accurately sized by conventional bobbin coil phase angle. Therefore, FPC chose to develop other methods to disposition these small volume indications. Two tube pull campaigns have supported the development of this criteria. FPC has determined that the proposed disposition strategy described in the description of this request is more accurate than the TW criteria currently in the TS.

#### **EVALUATION OF REQUEST:**

The approach used by FPC to evaluate the proposed disposition strategy is consistent with Regulatory Guide (RG) 1.121 and with that taken in past FPC submittals on this subject. Attachment 1 to this TSCRN contains the basis for the proposed small volume eddy current indication disposition strategy. This basis document has been developed from the analysis provided previously (Reference D) and reflects additional knowledge and experience gained by FPC as a result of Refuel Outage 9 (9R), the 9R tube pull, and various industry and Owners Group initiatives which have occurred since those first submittals. The evaluation presented in the basis document demonstrates the adequacy of the proposed disposition strategy. FPC considers the essential elements for demonstrating the acceptability of the proposed approach to be:

#### **Structural adequacy of the tubing**

Section 4.2 of Attachment 1 discusses relationship between burst pressure and the proposed dimensional extent limits. It also discusses the results of a structural analysis performed by MPR and Associates Inc. and the subsequent review of this initial analysis performed by Packer Engineering. The structural analysis calculated the maximum allowable tube wall degradation for all damage mechanisms and defect geometries postulated for CR-3 OTSG tubing.

Section 4.3 provides a discussion of field data relative to the structural limit. This section extensively discusses burst testing results of the 1992 and 1994 pulled tubes and evaluates burst pressure data for IGA and wear mechanisms respectively. This evaluation concludes the proposed structural limits provide considerable margin above the RG 1.121 allowable values for steam generator tube degradation.

#### **Growth rate of tube indications at CR-3**

Section 4.5 of Attachment 1 documents the results of three independent reviews to assess the growth rate of indications present in the CR-3 OTSGs. The studies, performed by the EPRI NDE Center, BWNS, and Packer Engineering, Inc. each concluded there to be little or no growth for the period of time examined. The proposed strategy, includes a mechanism (Section 4.5) which ensures this conclusion is validated during future inspections.

#### **Non-destructive examination (NDE) considerations in morphology determination**

Section 3 of Attachment 1, assesses the ability of RPC to accurately identify the morphology of low volume eddy current indications. This section also discusses the results of a regression analysis of volumetric degradation dimensional data which shows a direct relationship between indication bobbin coil signal amplitude and volume. This section also demonstrates the conservatism of the RPC measurement technique discontinuity as applied to determining volumetric morphology dimensional extents.

#### **Conservatism of signal amplitude and dimensional plugging limits**

Sections 4.2 and 5.2 of Attachment 1, provide the basis for the proposed bobbin coil amplitude (voltage)-based limits of 0.9 and 2.5 volts and for the dimensional-based limits of 0.33 inches axial extent and 0.6 inches circumferential extent. The axial and circumferential limits selected within the range of interest (low S/N and >2.5 volts) reduce the significance of TW sizing since, the limits were developed assuming a 100% TW defect. CR-3's operating experience demonstrates there is a low probability for this to happen.

#### **Leakage considerations**

Section 5 of Attachment 1, addresses primary to secondary leakage with a defense-in-depth approach that includes an NDE repair limit for leakage designed to ensure a minimum tube wall thickness is maintained for all tubes. This approach is tailored towards ensuring no leakage under worst-case accident conditions.



#### SHOLLY EVALUATION OF REQUEST:

Florida Power Corporation has reviewed the requirements of 10 CFR 50.92 as they relate to the proposed method for dispositioning small volume OTSG tube eddy current indications and determined that the proposed change does not involve a significant hazards consideration. In support of this conclusion the following analysis is provided:

1. The proposed change will not significantly increase the probability or consequences of an accident previously evaluated. The relevant accidents are excessive leakage or steam generator tube rupture (as a consequence of MSLB or otherwise).

RG 1.121 establishes a standard method for demonstrating structural integrity under worse-than-DBE conditions. The existing TS is based on this RG. The S/N disposition strategy continues to rely on this guidance. Current TW sizing techniques would allow defects greater than the current TS limit of 40 % to remain in service since these techniques do not accurately measure percent wall penetration for small volume indications. The proposed disposition strategy is based in measurable eddy current parameters of voltage, axial extent, and circumferential extent shown to provide a higher confidence that unacceptable flaws are removed from service. Therefore, the probability of a Steam Generator Tube Rupture (SGTR) is not increased and may well be decreased by implementation of this S/N disposition strategy.

The probability of OTSG tube leakage during normal operation or accident conditions is not adversely affected by the proposed S/N disposition strategy. Operating history indicates essentially no primary to secondary leakage through the OTSG tubes at CR-3. Growth rate studies imply this trend could be expected to continue. Therefore, current leakage limits are retained. Small volume indications which might leak during worse-case FWLB conditions are addressed in the RG 1.121 evaluation. The disposition strategy ensure these indications are removed from service as part of the inservice inspection. Once detected, the proposed criteria is at least as effective in determining those indications which should be removed from service as are the existing TS limits.

The S/N disposition strategy is an integral part of an overall effort to better address these and similar phenomena in OTSGs.

2. The proposed change will not create the possibility of a new or different kind of accident from any accident previously evaluated.

The key 'new or different' accidents addressed in this and similar proposals is the potential for MSLB-induced multiple SGTR or excessive primary-to-secondary leakage during such events. While these events are addressed in CR-3 Emergency Operating Procedures (EOPs), they are beyond those licensed for the facility.

**SHOLLY EVALUATION OF REQUEST (continued)**

However, as noted above, the probability of MSLB induced multiple SGTR is reduced by more effective screening and plugging/sleeving criteria. The probability of detection and identification of tubes which should be removed from service is maintained or improved by the S/N disposition strategy. The likelihood of adverse effects from plugging sound tubes is reduced. The operation of the OTSG or related structures, systems or components is otherwise unaffected.

3. The proposed change will not involve a significant reduction to any margin of safety.

The margins of safety defined in RG 1.121, including the required pressure used in the structural analysis, are retained. The probability of detecting degradation is unchanged since bobbin coil methods will continue to be the primary means of initial detection. The probability of leakage remains acceptably small. The proposed S/N disposition strategy is an enhancement to the inservice inspection of OTSG tubing that will provide a higher level of confidence that tubes exceeding the allowable limits are repaired while sound tubes are left in service. Based upon results of the various growth rate studies, the probability of an accident at the end of cycle is essentially the same as the beginning.

AFFIDAVIT OF G. L. BOLDT

- A. My name is G. L. Boldt. I am the Vice President - Nuclear Production for the Florida Power Corporation (FPC), and as such I am authorized to execute this affidavit.
- B. I am familiar with the criteria set forth in Title 10 of the Code of Federal Regulations, Part 2.790 (10 CFR 2.790), to determine whether certain information of FPC is proprietary.
- C. The following information is provided to demonstrate that the provisions of 10 CFR 2.790 have been considered:
- (i) The information contained in Exhibit "A", which is attached hereto and made a part hereof, has been held in confidence by FPC. Copies of the document are clearly identified as proprietary. In addition, should FPC transmit the information identified in Exhibit "A" to an external agency, the recipient will be requested to hold the information as proprietary, as FPC has requested the Nuclear Regulatory Commission to so do.
  - (ii) FPC applied the following criteria in determining whether the information in Exhibit "A" should be classified as proprietary. Information may be classified as proprietary if one or more of these criteria are met:
    - a. The information reveals data or material concerning FPC research or development plans or programs of present or potential competitive advantage to FPC.
    - b. The use of the information by a competitor would decrease his expenditures, in time or resources, in designing, producing or marketing a similar product.
    - c. The information consists of test data or other similar data concerning a process, method, or component, the application of which results in a competitive advantage to FPC.
    - d. The information reveals special aspects of a process, method, component or the like, the exclusive use of which results in a competitive advantage to FPC.

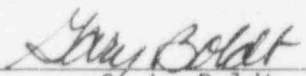
FPC has determined that the document listed in Exhibit "A", contains information which falls within one or more of the criteria enumerated above.

AFFIDAVIT OF G. L. Boldt (Cont'd.)

Exhibit "B", which is attached hereto and made a part hereof, identifies which specific criteria applies to the document listed in Exhibit "A".

- (iii) The document listed in Exhibit "A", which has been made available to the United States Nuclear Regulatory Commission was made available in confidence with a request that the document and the information contained therein be withheld from public disclosure.
- (iv) The information contained in Exhibit "A" is not available in the open literature and to the best of our knowledge is not known by current or potential domestic or foreign competitors of FPC.
- (v) Specific information with regard to whether public disclosure of the information in Exhibit "A" is likely to cause harm to FPC's competitive position. Taking into account the value of the information to FPC; the amount of money or effort FPC expended developing the information; and the ease or difficulty with which the information could be properly duplicated by others is given in Exhibit "B".

D. I have personally reviewed the document listed on Exhibit "A" and have found that it is considered proprietary by FPC because it contains information which falls within one or more of the criteria enumerated in Paragraph C. Exhibit "A" contains information which affords FPC an opportunity to obtain a competitive advantage over those who may wish to know or use the information contained in the document.

  
G. L. Boldt

STATE OF FLORIDA

COUNTY OF CITRUS

G. L. Boldt states that he is the Vice President, Nuclear Production for Florida Power Corporation; 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.

G. L. Boldt

G. L. Boldt  
Vice President  
Nuclear Production

G. L. Boldt, personally known to me. Subscribed and sworn to before me, a Notary Public in and for the State and County above named, this 31st day of May, 1995.

JOAN BUFE CARR

Notary Public (print)

Joan Bufe Carr

Notary Public (signature)

Notary Public, State of Florida at Large,

My Commission Expires: 6-21-95

NOTARY PUBLIC, STATE OF FLORIDA.  
MY COMMISSION EXPIRES: June 21, 1995.  
BONDED THROUGH NOTARY PUBLIC UNDERWRITERS.



EXHIBITS A & B

EXHIBIT A

Florida Power Corporation Report "Alternate Disposition Strategy for Low Volume OTSG Eddy Current Indications", dated May 31, 1995.

EXHIBIT B

The above listed document contains information which is considered proprietary in accordance with Criteria 'b' and 'c' of the attached affidavit.