



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
245 PEACHTREE CENTER AVENUE NE, SUITE 1200  
ATLANTA, GEORGIA 30303-1257

November 10, 2010

Mr. Jon A. Franke  
Vice President, Crystal River Nuclear Plant  
Crystal River Nuclear Plant (NA2C)  
15760 W. Power Line Street  
Crystal River, FL 34428-6708

**SUBJECT: CRYSTAL RIVER NUCLEAR PLANT - NRC LICENSE RENEWAL FOLLOW-UP  
INSPECTION REPORT 05000302/2010009**

Dear Mr. Franke:

On October 6, 2010, the U.S. Nuclear Regulatory Commission (NRC) completed the License Renewal Follow-Up Inspection at your Crystal River Unit 3 Nuclear Plant. When combined with the License Renewal Inspection conducted in August 2009 and documented in NRC Report 2009006, this inspection completes our inspection activities that support the application for a renewed license for Crystal River Unit 3. The enclosed report documents the inspection results, which were discussed on October 7, 2010 with you and members of your staff in an exit meeting conducted at the Crystal River Nuclear Plant.

The purpose of this inspection was to examine activities that were identified for a follow-up inspection in NRC License Renewal Inspection Report 05000302/2009006. That inspection was conducted prior to your staff's response to NRC Requests for Additional Information (RAIs) that were associated with the NRC License Renewal Scoping Audit and the License Renewal Aging Management Program (AMP) Audit. The inspectors determined that some AMPs would require further review before a specific determination could be made whether the program would maintain the function of the in-scope Structures, Systems, and Components (SSCs) through the period of extended operation. Those AMPs included the Steam Generator Monitoring Program, the Carborundum (B4C) Monitoring Program, the One Time Inspection Program and the Internal Surfaces in Miscellaneous Piping and Ducting Components program.

The scope of this inspection included the development and implementation of the AMPs identified above to support a period of extended operation. As part of the inspection, the NRC examined implementation plans, procedures and records, interviewed personnel, and visually examined accessible portions of various SSCs to observe any effects of equipment aging.

The inspectors determined that when these programs are implemented as described in your License Renewal Application there was reasonable assurance that the intended functions of plant systems, structures, and components related to these programs will be maintained through the period of extended operation. The inspectors also determined that documentation supporting the application was generally in an auditable and retrievable form.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

**/RA/**

Mark E. Franke, Chief  
Engineering Branch 3  
Division of Reactor Safety

Docket No.: 50-302  
License No.: DRP-72

Enclosure: Inspection Report 05000302/2010009  
w/Attachment: Supplemental Information

cc w/encl.: (See page 3)

cc w/encl:

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Letter to Jon A. Franke from Mark E. Franke dated November 10, 2010.

SUBJECT: CRYSTAL RIVER NUCLEAR PLANT - NRC LICENSE RENEWAL FOLLOW-UP INSPECTION REPORT 05000302/2010009

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|--------------|------------|----------------|-------------|------------|----|-----|----|
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| SIGNATURE    | RA         | RA             | RA          | RA         |    |     |    |
| NAME         | L. Lake    | J Rivera Ortiz | D. Rich     | FRANKE     |    |     |    |
| DATE         | 11/9 /2010 | 11/9 /2010     | 11/ 9 /2010 | 11/10/2010 |    |     |    |
| E-MAIL COPY? | YES        | YES            | N YES       | YES        | NO | YES | NO |

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LICENSE RENEWAL .DOC

**U. S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

Docket No: 50-302

License No: DRP 72

Report No: 05000302/2010009

Licensee: Progress Energy Company

Facility: Crystal River Unit 3

Location: 15760 West Power Line Street  
Crystal River, Florida

Dates: October 4, 2010 through October 6, 2010

Inspectors: L. Lake, Senior Reactor Inspector Team Leader  
J. Rivera-Ortiz, Senior Reactor Inspector

Approved by: M. Franke, Chief  
Engineering Branch 3  
Division of Reactor Safety

Enclosure

## REPORT DETAILS

### I Inspection Scope

This inspection was conducted by NRC Region II inspectors to complete the review of five Aging Management Programs (AMPs) that were not able to be fully reviewed during the license renewal inspection conducted in 2009 (IR 05000302/2009006) due to insufficient information or open Requests for Additional Information (RAI). The inspectors reviewed the applicant's response to open RAIs and the incorporation of the RAI's responses into the applicable AMP documents. The inspectors reviewed implementation plans and associated activities to verify their consistency with the License Renewal Application (LRA) and their incorporation into a system to track and assure their implementation. The inspectors verified that AMP areas identified in IR 05000302/2009006 with insufficient information were addressed. Additionally, the inspectors discussed the program implementation with responsible applicant personnel to assess their knowledge and involvement in the license renewal effort. This inspection was also conducted to observe any aging effects on the material condition of plant areas that are normally inaccessible during at-power operations.

Specifically, the follow-up inspections included inspection walk down of the reactor containment and the Spent Fuel Pool A and B, and a review of the Steam Generator Tube Integrity Program, the Carborundum (B4C) Monitoring Program, the Bolting Integrity Program, the One Time Inspection Program and the Internal Surfaces in Miscellaneous Piping and Ducting Components program.

#### A. Visual Observation of Plant Equipment

1. The inspectors performed a walk-down of the Unit 3 reactor containment to determine its current condition and to observe any effects of equipment and structures aging. During this walk-down, the inspectors did not identify any significant issues with plant material condition that would adversely affect the license renewal process.
2. The inspectors performed a walk-down of the Unit 3 Spent Fuel Pool A and B to determine its current condition and to observe any effects of equipment and structures aging. During this walk-down, the inspectors did not identify any significant issues with plant material condition that would adversely affect the license renewal process.

#### B. Review of Mechanical Aging Management Programs

##### 1. Bolting Integrity Program

The objective of Bolting Integrity Age Management Program is to manage cracking, loss of material, and loss of preload in mechanical bolted closures. The scope of the program covers all safety-related and non-safety-related bolting for pressure-retaining components within the scope for license renewal, with the exception of the reactor vessel head studs which are addressed in a separate program.

Enclosure

The inspectors reviewed the program implementation plan and discussed the program with station license renewal staff. The inspectors determined that the applicant had provided adequate guidance to ensure aging effects will be appropriately managed. The inspectors found that the applicant addressed the program enhancements and RAIs generated by the NRC staff for this program and that program procedures were revised to incorporate the applicant's response to the RAIs. The inspectors also found that the applicant generated task action items to ensure that the AMP elements were incorporated into the implementing procedures.

The inspectors determined that the applicant had provided adequate guidance to ensure aging effects will be appropriately managed. The inspectors also found that the applicant designated an owner for this program. The inspectors concluded that the existing Bolting Integrity Program was generally effective and included the elements described in the LRA. The inspectors determined that there was reasonable assurance that this program would assess and manage the aging effects of in-scope SSCs to maintain their function through the period of extended operation.

## 2. Steam Generator Tube Integrity Program

This is an existing condition monitoring program and is a subprogram of the Crystal River Unit 3 (CR-3) overall Steam Generator (SG) Integrity Program, which is an integrated program for managing the condition of the CR-3 steam generators. The objective of the AMP is to manage degradation of tubes, tube plugs, sleeves, tube supports, and secondary-side components whose failure could prevent the steam generator from fulfilling its intended safety function.

The inspectors reviewed the program implementation plan and discussed the program with station license renewal staff. The inspectors determined that the applicant had provided adequate guidance to ensure aging effects will be appropriately managed. The inspectors found that the applicant addressed the RAIs generated by the NRC staff for this program and that program procedures were revised to incorporate the applicant's response to the RAIs. The inspectors also found that the applicant generated task action items to ensure that the AMP elements were incorporated into the implementing procedures.

The inspectors concluded that the existing Steam Generator Tube Integrity Program was generally effective and included the elements described in the LRA. The inspectors determined that there was reasonable assurance that this program would assess and manage the aging effects of in-scope SSCs to maintain their function through the period of extended operation.

## 3. One-Time Inspection Program

This new program will use one-time inspections to provide objective evidence that an aging effect is not occurring, or that the aging effect is occurring slowly enough not to affect the SSCs' intended function during the period of extended operation, and will therefore not require additional aging management. The inspections will be performed prior to the period of extended operation. This program will verify the effectiveness of

the aging management programs for water chemistry control, diesel fuel oil, and lube oil analysis.

The inspectors reviewed the program implementation plan and discussed the program with station license renewal staff. The inspectors determined that the applicant had provided adequate guidance to ensure aging effects will be appropriately managed. The inspectors found that the applicant addressed the determination of sample size, specific sample locations, and the acceptance criteria for inspections. The inspectors also found that the applicant generated task action items to ensure that the AMP elements were incorporated into the implementing procedures.

The inspectors concluded that the One Time Inspection Program would be effective and included the elements described in the LRA. The inspectors determined that there was reasonable assurance that this program would assess and manage the aging effects of in-scope SSCs to maintain their function through the period of extended operation.

#### 4. Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

This new program is intended to inspect the internal surfaces of steel piping, piping components, ducting and other components that are not covered by other aging management programs. Examination techniques are primarily visual examination, but other non-visual Non-Destructive Examination (NDE) such as physical manipulation of elastomers will be included. The program will be implemented via existing and new preventative maintenance, surveillance testing, and periodic testing work orders.

The inspectors reviewed the program implementation plan and discussed the program with station license renewal staff. The inspectors determined that the applicant had provided adequate guidance to ensure the implementing procedures for this program were incorporated into the implementation plan and that aging effects will be appropriately managed. The inspectors also found that the applicant generated task action items to ensure that the AMP elements were incorporated into the implementing procedures.

The inspectors concluded that the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program would be effective and included the elements described in the LRA. The inspectors determined that there was reasonable assurance that this program would assess and manage the aging effects of in-scope SSCs to maintain their function through the period of extended operation.

#### 5. Carborundum (B4C) Program

License Renewal Application, Amendment 9 revised the neutron absorber program to the CR-3 Fuel Pool Rack Neutron Absorber Monitoring Program. This program monitors the effects of aging on the neutron absorber panels in the high density spent fuel storage racks installed in the CR-3 spent fuel pools. Carborundum (Spent Fuel Pool A) and Boral (Spent Fuel Pool B) are shielding materials utilized as a neutron absorber. Stability of the shielding material supports the fuel storage pool Technical Specifications 3.7.14 and 3.7.15 criticality analysis requirements that the effective neutron multiplication

factor of  $K_{eff} \leq 0.95$  must be maintained for all postulated events. The program periodically removes and examines Carborundum (B4C) poison samples from the pool to insure that the effective multiplication factor is maintained. The program performs Boron-10 Area Density Gauge for Evaluating Racks (BADGER) testing or comparable neutron attenuation testing in Pools A and B to ensure that the spent fuel rack neutron absorber intended function is maintained.

The parameters monitored verify that: (1) Carborundum (B4C) sample coupons meet visual acceptance criteria and will be managed during the period of extended operation, and (2) Carborundum (B4C) sample weight loss shall be within acceptable criteria and will be managed during the period of extended operation. The inspections monitor Carborundum (B4C) samples that have been exposed to either, (1) gamma radiation dose plus borated water, or (2) borated water alone, to determine percentage weight loss of the sample. As a result of the low percentage weight loss of Carborundum (B4C) for sample inspections performed every five years, the inspection interval has been increased to nominally every 10 years. CR-3 will perform periodic in-situ BADGER testing or comparable neutron attenuation testing of spent fuel racks in Pool A and Pool B to directly monitor neutron absorption capabilities of Carborundum and Boron absorber materials in these racks.

The inspectors reviewed the licensee's response to RAIs B.2.37-1, B.2.37-2 and B.3.3.2.2.6-1, and the program implementation plan and discussed the program with station license renewal staff. The inspectors determined that the applicant had provided adequate guidance to ensure the implementing procedures for this program were incorporated into the implementation plan and that aging effects will be appropriately managed. The inspectors found that the applicant generated task action items to ensure that the AMP elements were incorporated into the implementing procedures.

The inspectors concluded that the Fuel Pool Rack Neutron Absorber Monitoring Program would be effective and included the elements described in the LRA. The inspectors determined that there was reasonable assurance that this program would assess and manage the aging effects of neutron absorber panels in the high density spent fuel storage racks installed in the CR-3 spent fuel pools throughout the extended period of operation.

## II Meetings, Including Exit

On October 6, 2010 the inspectors presented the inspection results to Mr. J. Franke and other members of your staff.

SUPPLEMENTAL INFORMATION

**KEY POINTS OF CONTACT**

Applicant Personnel

J. Franke, Vice President  
Dennis Herrin, Licensing Contact  
Mike Heath, Supervisor License Renewal  
Chris Mallner, License Renewal Mechanical  
Jeff Lane, Lead Engineer Mechanical  
Scot Stewart, SG Tube Integrity Program Manager  
Robert Reynolds, License Renewal Mechanical  
Rick Portman, Containment Programs Engineer  
Greg Estep, Crystal River program Manager  
Mike Colbert, Neutron Absorber Program Manager

**LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

Opened

None

Opened and Closed

None

Closed

Follow-up items from Crystal River License Renewal Inspection Report 2009006.

## LIST OF DOCUMENTS REVIEWED

### Procedures

CP-152, "Primary to Secondary Leakage Operating Guidelines," Revision 20 and 21  
CH-266, "Primary to Secondary Leak Rate Monitoring Guidelines," Revision 20  
SP-0305, "OTSG Inservice Inspection," Revisions 31, 32, and 33  
EGR-NGGC-0208, "Steam Generator Integrity Program," Revision 10  
SP-192, High Density Rack Poison Sampling SF Pool A, Rev. 2

### Action Request Documents

AR 304745, Action Plan for One Time Inspection Program  
AR 405790, One Time inspection of concrete and rebar in Tendon Access area.  
AR 386911, Incorporate LR implementation into procedure EGR-NGGC-0512.  
AR 389621, prepare procedure EGR NGGC-0516 License Renewal One-Time Inspection Aging Management Program.  
AR 304745-18, Action Plan for inspection of internal surfaces.  
AR 416943, License Renewal PM-EFP-3 Air Intake Filler Housing  
AR 299996, "Discontinue Use of Molykote-G Lubricant"  
AR 304745-53, "Action Plan for SG Tube Integrity Program"  
AR 424228, Development of procedure for Neutron Monitoring  
AR 391481, Revise procedure SP-192 to identify monitoring of Carborundum Racks  
AR 386900, "MNT-NGGC-0016"  
DRR 425034, Revise L08-0624 to add samples and populations/acceptance criteria.  
DRR 356246, Eddy Current Data Analysis Guidelines Revision 4  
DRR 384617, Update Eddy Current Data Analysis Guidelines for 17R Use  
DRR 385951, Eddy Current Data Analysis Guidelines Revision 4  
DRR 386909, "ISINDEPM-1 Incorporate License Renewal Inspections"  
DRR 394527, Eddy Current Data Analysis Guidelines Revision 4  
NCR 375888, "CP-152 does not meet EPRI Guidelines for a Primary-to-Secondary Leak"  
NCR 376688, "Potential Discrepancies in Steam Generator Program Document"  
NCR 380401, "Potential discrepancies in Steam Generator Program Procedure"  
NTM 304745-05, "Implementation Actions for CR-3 License Renewal Commitments – Modification of Existing Bolting Integrity Program"  
NTM 424106, "License Renewal Inspections – NSSS Support Bolting"  
NTM 425215, "Update License Renewal Application to Reflect RAI Response"  
PRR 341230, "CP-152, R19, Primary to Secondary Leakage Operating Guideline"  
PRR 375864, "SP-0305, R32, OTSG Inservice Inspection"  
PRR 375866, "CP0152, R20 Primary to Secondary Leakage Operating Guideline"  
PRR 381184, "CH0266, R19, Primary to Secondary Leak Rate Monitoring"  
PRR 382084, "EGR-NGGC-0208"

### Other Documents

3F0310-01, "Crystal River Unit 3 – Response to Request for Additional Information for the Review of the Crystal River Unit 3 Nuclear Generating Plant, License Renewal Application," 03/03/2010

3F1009-07, Enclosure 1, "Crystal River Unit 3 – Response to Request for Additional Information for the Review of the Crystal River Unit 3 Nuclear Generating Plant, License Renewal Application," 10/13/2009

3F1209-12, Enclosure 1, "Crystal River Unit 3 – Response to Request for Additional Information for the Review of the Crystal River Unit 3 Nuclear Generating Plant, License Renewal Application," 12/30/2009

Document 259604, "Pre-service Eddy Current Data Analysis Procedure of Alloy 690 Tubing for Crystal River Unit 3 Replacement Steam Generators"

Engineering Change 73481, "CR3 OTSG 16R, Pre-Service Degradation Assessment," Revision 1

L08-0632, license Renewal Aging Management Program Description of CR-3 Fuel Pool Rack Neutron Absorber Monitoring Program, Rev. 2

L08-0633, "License Renewal Aging Management Program Description of the Bolting Integrity Program," Revision 2

L08-0634, "License Renewal Aging Management Program Description of the Steam Generator Tube Integrity Program," Revision 2

L08-0630, Internal Surfaces and Miscellaneous Piping and Ducting Components program,

L08-0624, One Time Inspection Program

Supplemental Response to RAI B.2.30-4

Response to RAI B.2.23-1 and B.2.23-1.1