



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

June 13, 2011

Mr. Jon Franke, Vice President
Crystal River Nuclear Generating Plant (NA1B)
ATTN: Supervisor, Licensing & Regulatory Programs
15760 W. Power Line Street
Crystal River, Florida 34428-6708

SUBJECT: AMP AUDIT REPORT REGARDING THE CRYSTAL RIVER UNIT 3 NUCLEAR
GENERATING PLANT, LICENSE RENEWAL APPLICATION
(TAC NO. ME0274)

Dear Mr. Franke:

By letter dated December 16, 2008, Florida Power Corporation, submitted an application pursuant to Title 10 of the *Code of Federal Regulations* Part 54, to renew the operating license for Crystal River Unit 3 Nuclear Generating Plant for review by the U.S. Nuclear Regulatory Commission (NRC or the staff). On March 2-4, 2011, the NRC audit team completed the on-site audit of the Compressed Air Monitoring and Concrete Containment Tendon Prestress aging management programs. The audit report is enclosed.

If you have any questions, please contact Robert Kuntz at 301-415-3733 or by e-mail at robert.kuntz@nrc.gov.

A handwritten signature in black ink, appearing to be "R. Kuntz", written over a faint, larger outline of the signature.

Robert F. Kuntz, Sr. Project Manager
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulations

Docket No. 50-302

Enclosure:
As stated

cc w/encl: Listserv

U.S. NUCLEAR REGULATORY COMMISSION

OFFICE OF NUCLEAR REACTOR REGULATION - DIVISION OF LICENSE RENEWAL

Docket No: 050-302
License No: DPR-72
Licensee: Florida Power Corporation
Facility: Crystal River Unit 3 Nuclear Generating Plant
Location: Crystal River Unit 3 Nuclear Generating Plant
15760 W. Power Line Street
Crystal River, FL 34428-6708
Dates: March 2-4, 2011
Reviewers: R. Sun, Mechanical Engineer, Division of License Renewal (DLR)
R. Auluck, Chief, DLR
A. Sheik, Sr. Structural Engineer, DLR

Approved By:
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Aging Management of Structures, Electrical, and Systems Branch
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David J. Wrona, Chief
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ENCLOSURE

Introduction

A three day audit was conducted by the U.S. Nuclear Regulatory Commission (NRC) project team at the plant in Crystal River, FL on March 2-4, 2011. The purpose of this audit was to examine the applicant's Compressed Air Monitoring and Concrete Containment Tendon Prestress aging management programs (AMPs) documentation for the Crystal River Unit 3 Nuclear Generating Plant (CR-3) and to verify the applicant's claim of consistency with the corresponding NUREG-1801, "Generic Aging Lessons Learned (GALL) Report" AMPs. Exceptions to the GALL Report AMP elements will be evaluated separately as part of the NRC staff's (the staff's) review of the CR-3 license renewal application (LRA) and documented in the staff's Safety Evaluation Report (SER).

The Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants (NUREG-1800) provides the staff guidance for reviewing a LRA. The Standard Review Plan allows an applicant to reference in its LRA the AMPs described in the GALL Report. By referencing the GALL Report AMPs, the applicant concludes that its AMPs correspond to those AMPs which are reviewed and approved in the GALL Report, and that no further staff review is required. If an applicant credits an AMP for being consistent with a GALL Report program, it is incumbent on the applicant to ensure that the plant program contains all of the elements of the referenced GALL Report program. The applicant's determination should be documented in an auditable form and maintained on-site.

During this audit, the staff audited program elements 1-6 (scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, and acceptance criteria), and program element 10 (operating experience), of the applicant's AMPs claimed to be consistent with the GALL Report against the related elements of the associated AMP described in the GALL Report, unless otherwise indicated in this Audit Report. Program elements 7-9 (corrective actions, confirmation process, and administrative controls) were audited by another NRC project team during the Scoping and Screening Methodology audit and are evaluated separately. The NRC project team audited AMPs that the applicant stated were consistent with the GALL Report.

During this audit the staff verified that the plant program contains all the elements of the referenced GALL Report program. In addition, the staff verified the conditions at the plant were bounded by the conditions for which the GALL Report program was evaluated.

In performing this audit, the staff examined the applicant's program bases documents and related references for these AMPs. The NRC project team also interviewed CR-3 representatives to obtain additional clarification related to the CR-3 AMPs. This report documents the staff activities during this audit.

LRA AMP B.2.21 Compressed Air Monitoring Program

In the CR-3 LRA, Amendment 13, dated November 12, 2010, the applicant states that AMP B.2.21 "Compressed Air Monitoring Program," is an existing program that is consistent with the program elements in GALL Report AMP (Revision 2) XI.M24, "Compressed Air Monitoring Program." To verify this claim of consistency, the staff audited the LRA AMP. Issues identified but not resolved in this report are addressed in the SER.

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent database search of the applicant's operating experience database using the keywords: "compressed air," "instrument air," "air quality," "condensation," "dew point."

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. L10-0600	License Renewal Aging Management Program Description of the Compressed Air Monitoring Program	Revision 0 10/25/2010
2. AI-1701	System Engineering Standards	Revision 12 9/7/2010
3. CH-400	Nuclear Chemistry Master Scheduling Program	Revision 49 11/10/2010
4. CH-600	Instrument Air System Moisture Check	Revision 6 12/09/2010
5. SP-300	Operating Daily Surveillance Log	Revision 223 12/29/2010
6. SP-306	Routine Surveillance Log	Revision 78 1/24/2011
7. 397239-04	Quick Hit Self-Assessment Report: Instrument Air Moisture and Particulate Monitoring	Revision 0 6/10/2010

During the audit of program elements 1-6, the staff found that:

Elements 1- 6 (scope of program, preventive action, parameter monitored/inspected, detection of aging effects, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP;

During the audit of program element 10 (Operating Experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e. no previously unknown aging effects were identified by the applicant or the staff);

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the FSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

verified that LRA program elements 1-6 are consistent with corresponding program elements in the GALL Report AMP;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging;

verified that the description provided in the FSAR Supplement is an adequate description of the program

LRA AMP B.3.3, Concrete Containment Tendon Prestress Program

In the CR-3 LRA Amendment 15, dated December 8, 2010, the applicant states that AMP B.3.3, "Concrete Containment Tendon Prestress Program," is an existing program with exceptions that are consistent with the program elements in GALL Report AMP X.S1, "Concrete Containment Tendon Prestress." To verify this claim of consistency the staff audited the LRA AMP. This audit report does not consider the sufficiency of exceptions. Issues identified but not resolved in this report are addressed in the SER.

The first exception affects LRA program element 5 (monitoring and trending). In the GALL Report AMP, this program element recommends that the estimated and measured prestressing forces be plotted against time, and the predicted lower limit (PLL), minimum required value (MRV), and trending lines be developed for the period of extended operation. NRC Regulatory Guide (RG) 1.35.1, "Determining Prestressing Forces for Inspection of Prestressed Concrete Containments," provides guidance for calculating PLL and MRV. Alternatively, this program element in the LRA states that CR-3 calculates expected (predicted) forces for individual tendons. These calculations account for the losses, elastic shortening, stress relaxation, concrete creep and shrinkage that are identified in RG 1.35.1, but do not develop upper and lower limits on the predicted forces. The LRA also states that this exception to the GALL Report AMP is consistent with the requirements of the American Association of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, Subsection IWL and is justified based on the NRC SER related to the CR-3, improved technical specification amendment issued on March 16, 2000.

The second exception affects LRA program element 6 (acceptance criteria). In the GALL Report AMP, this program element recommends that the acceptance criteria should consist of PLL and the minimum required prestressing force, also called MRV. The PLL and MRV are calculated in accordance with NRC RG 1.35.1. Alternately, this program element in the LRA states that CR-3 accounts for the effects of the prestress losses identified in RG 1.35.1 to determine the predicted value or base value for individual tendons to account for prestress losses, but does not develop upper and lower limits on predicted forces. The LRA also states that the use of a single predicted force, rather than a predicted lower limit as an acceptance value is consistent with ASME Code Section XI, Subsection IWL, Article IWL-3000, "Acceptance Standards," and the additional requirements of Title 10 of the *Code of Federal Regulations* Section 50.55a (10 CFR 50.55a).

During its audit, the staff conducted walkdowns, interviewed the applicant's staff, and reviewed onsite documentation provided by the applicant. The staff also conducted an independent search of the applicant's operating experience database.

The table below lists the documents which were reviewed by the staff and were found relevant to the audit. These documents were provided by the applicant or were identified in the staff's search of the applicant's operating experience database.

Relevant Documents Reviewed

Document	Title	Revision / Date
1. L10-0601	License Renewal Aging Management Program Description Of The Concrete Containment Tendon Prestress program,	Rev. 0, Issued 11/30/2010
2. SP -182	Reactor Building Structural Integrity Tendon Surveillance Program	Rev. 17, Issued 12/23/2010
3. S10-0028	Containment Repair Project – Reactor Building Tendons/Forecast End Of Life Force	Rev. 1, Issued 5/27/2010

The staff conducted its audit of LRA program elements 1–6 based without considering aspects of program elements 5 and 6 (monitoring and trending, and acceptance criteria) of the LRA AMP which are associated with the exceptions. Aspects of these elements not associated with the exceptions were evaluated and are described below:

During the audit, the staff found that:

elements 1, 2, and 4 (scope of program, preventive actions, and detection of aging effects) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP;

sufficient information was not available to determine whether elements 3, 5, and 6 (parameters monitored, monitoring and trending, and acceptance criteria) of the LRA AMP were consistent with the corresponding elements of the GALL Report AMP.

In order to obtain the information necessary to verify whether the LRA program element numbers 3, 5, and 6 are consistent with the corresponding elements of the GALL Report AMP, the staff will consider issuing RAIs for the following subjects:

As a result of concrete delamination found during the hydro-demolition of the reactor building wall for steam generator replacement in 2009, all of the vertical and more than half of the hoop tendons have to be retensioned. Documents reviewed (L08-0514) by the staff during the audit indicate that the applicant plans to use the previously calculated trend lines to monitor and trend the prestressing forces in the dome and undisturbed hoop tendons. Retensioning of all of the vertical and more than half of the hoop tendons will affect the forces in the dome and the undisturbed hoop tendons. In addition, the trend lines previously developed for the undisturbed dome and hoop tendons are not based on updated values of concrete creep. It is not clear to the staff how the previously calculated trend lines for the dome and undisturbed hoop tendons are acceptable for use during future surveillances to be completed during the period of extended operation.

ASME Code, Section XI, Subsection IWL, Article IWL-2521, states that, "One tendon of each type (as defined in Table IWL-2521-1) shall be selected from the first year inspection sample and designated as a common tendon. Each common tendon shall be examined during each inspection." As a result of concrete delamination found during the hydro-demolition of the reactor building wall for steam generator replacement in 2009, all of the vertical, and more than half of the hoop tendons, have to be retensioned. These retensioned tendons include the common vertical tendon and may also include common hoop tendon. It is not clear to the staff how common hoop and vertical tendons will be selected during the period of extended operation.

Element 5 of the GALL AMP X.S1 recommends that the estimated and measured prestressing forces be plotted against time, and the PLL, MRV, and trending lines are developed for the period of extended operation. In a letter dated February 25, 2011, the applicant provided a schedule for performing surveillance of the re-tensioned vertical and hoop tendons. According to this schedule, the applicant plans to perform surveillance of the hoop and the vertical tendons only once (during 2011-2012) prior to the period of extended operation. It is not clear to the staff how the applicant plans to perform regression analyses and log-linear trend plots for the re-tensioned vertical and hoop tendons using data collected during only one surveillance prior to period of extended operation.

Element 6 of the GALL AMP X.S1 states that the existing prestressing forces in the containment tendon should not be below the MRV or the minimum required prestressing force prior to the next scheduled inspection, as required by 10 CFR 50.55a(b)(2)(viii)(B). During the audit the staff reviewed the program basis and implementation documents for the applicant's Concrete Containment Tendon Prestress Program, and found that MRV values listed in these documents are not current and lower than those noted in the revised containment analysis calculation.

During the audit of program element 10 (operating experience), the staff found that:

the operating experience provided by the applicant and identified by the staff's independent database search is bounded by industry operating experience (i.e. no previously unknown aging effects were identified by the applicant or the staff);

the operating experience provided by the applicant and identified by the staff's independent database search is sufficient to allow the staff to verify that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging effects during the period of extended operation.

The staff also audited the description of the LRA AMP provided in the FSAR Supplement. The staff found this description to be consistent with the description provided in the SRP-LR and, therefore, acceptable.

Based on this audit the staff:

verified that most of the LRA program elements 1-6 are consistent with the corresponding program elements in the GALL Report while identifying certain aspects of LRA program elements 3, 5, and 6 for which additional information or additional evaluation is required before consistency can be determined;

verified that the operating experience is sufficient to indicate that the LRA AMP, as implemented by the applicant, is sufficient to detect and manage aging.

verified that the description provided in the FSAR Supplement is an adequate description of the program.

June 13, 2011

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/RA/

Robert F. Kuntz, Sr. Project Manager
Projects Branch 2
Division of License Renewal
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Docket No. 50-302

Enclosure:
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*concurrence via email

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DATE	05/31/2011	06/06/2011	06/07/2011	06/07/2011	06/13/2011	06/13/2011

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Letter to Jon Franke from Robert F. Kuntz dated June 13, 2011

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