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

August 17, 2010

LICENSEE: PROGRESS ENERGY

FACILITY: Crystal River, Unit 3

SUBJECT: SUMMARY OF JUNE 30, 2010, MEETING WITH PROGRESS ENERGY, ON CONTAINMENT INVESTIGATION AND REPAIR ACTIVITIES AT CRYSTAL RIVER, UNIT 3 (TAC NO. ME2372)

On June 30, 2010, a Category 1 public meeting was held between the U.S. Nuclear Regulatory Commission (NRC) and representatives of Progress Energy (the licensee) at NRC Headquarters, One White Flint North, 11555 Rockville Pike, Rockville, Maryland. The purpose of the meeting was to discuss the licensee's plans for repairing the containment at Crystal River, Unit 3. A list of attendees is enclosed.

The licensee presented information (Agencywide Documents Access and Management System Accession No. ML101940524). The licensee began its presentation by giving an overview of the Crystal River, Unit 3 containment structure and identification of containment delamination during the steam generator replacement activities. In order for the licensee to replace the steam generator(s), the licensee removed a 25 ft by 27 ft section of concrete from the containment and detensioned and removed vertical and horizontal tendons in the open section of containment in a predetermined sequence to help redistribute stresses. After the concrete and tendons were removed, the licensee discovered separation or delamination of the concrete between the horizontal sleeves, as depicted on page 12 of the licensee's presentation.

To determine the extent of the condition, the licensee performed a root-cause analysis by using non-destructive testing of the containment wall surfaces. The method the licensee used was impulse response and ground penetrating radar. These methods helped the licensee determine the entire delaminated area of containment, as depicted on page 19 of the licensee's presentation. Progress Energy used over 150 core bores, along with boroscopic inspections to validate the impulse response results. At the conclusion of the root cause analysis, the licensee determined that the number and order of detensioned tendons resulted in redistribution of stresses in the containment wall that exceeded tensile capacity, initiating the delamination. The code that was used was not able to predict the highest stresses. The licensee continued by stating that the removal of concrete increased the stress in the remaining concrete, contributing to the final extent or shape of delamination. The NRC asked the licensee if there was another detensioning method that would not have caused delamination. The licensee responded by stating, "Yes, because we used a 3-dimensional code that was better able to predict stress concentrations during repair and additional detensioning without additional delamination."

Progress Energy discussed its repair approach to the NRC, and other alternatives that were considered but rejected, which included use as is, anchorage only, cementitious grout, and epoxy resin. The licensee plans on removing the delaminated area that includes three depths of the concrete and replacing the concrete for its repair approach. The NRC asked if the

tendons will be replaced to restore the building. The licensee responded by stating, "Yes, all tendons will be replaced that were cut to remove the steam generator replacement hole." As of June 30, 2010, the licensee has removed all of the delaminated area and concrete at the three depths. The NRC asked if there were any other delaminated areas observed from detensioning of the tendons and removal of the concrete. The licensee responded by stating that no new delamination has been observed, but hairline cracks have been observed. The licensee continued by stating that they would provide more details on how they plan to address the hairline cracks later in the presentation.

Progress Energy also discussed its plan for completing all of the repair activities under Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.59 or without prior NRC approval (i.e., license amendment). The licensee stated that they plan on using a higher minimum required prestress force but does not need prior NRC approval because the change will be able to be implemented under 10 CFR 50.59 per Nuclear Energy Institute (NEI) 96-07 guidance. Per NEI 96-07, the licensee has determined the change is an input to the evaluation methodology. The licensee also stated it is acceptable under 10 CFR 50.59 because it is not a design basis limit for a fission product barrier and the values are not in the final safety analysis report. Progress Energy also communicated to the NRC that the method of evaluation has not changed even though a different finite element analysis program is being used. The original design analysis used Kalnins finite differences analysis and finite element analysis and the new or restoration analysis uses ANSYS finite element analysis. The licensee justifies using a different program as not being a change in methodology and not needing prior NRC approval because: (1) both programs, the original analysis and restoration analysis, use finite element analysis; and (2) ANSYS is a widely used finite element analysis tool applied under 10 CFR 50, Appendix B, and can be used without prior NRC approval per NEI 96-07 since the results are conservative or essentially the same as the original results.

Progress Energy indicated they plan on repairing the hairline cracks identified after the additional detensioning or will show leaving the cracks as-is meet code requirements. The licensee continued by stating that the hairline cracks will be repaired above, below, and adjacent to the steam generator replacement opening and that other reinforced areas (in Bay 3-4) with hairline cracks will be shown to meet code requirements by testing and analysis. The NRC stated that the staff will review the licensee's 10 CFR 50.59 evaluation once it is complete. Also, the NRC staff indicated that 150 questions had been generated as part of the ongoing special inspection. Several of these questions address leaving the hairline cracks as-is and the ability to continue to meet Crystal River's current licensing basis with the hairline cracks. The NRC emphasized to Progress Energy the importance of prioritizing the questions and ensuring all questions are answered.

Members of the public were in attendance. A member of the public stated that it's apparent to him that the cracks were identified after the hydro-demolition, so the licensee cannot provide reasonable assurance that the hairline cracks do not exist in other sections of containment.

The member of the Public continued by stating that some more destructive testing should be done to ensure no additional hairline cracks exist. The member of the public also stated that he believes the licensee has been very aggressive and thorough in completing the repair activities and wants the NRC to double check the licensee's activities. Another member of the public asked how the licensee is testing the rebar connections between the old and new rebar, and continued by stating he thought that they [Progress Energy] should selectively remove a sample of actual crimped connections in the repair area and test them. Public Meeting Feedback forms were not received.

Please direct any inquiries to me at 301-415-5888, or Jason.Paige@nrc.gov.

Jason C. Paige, Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-302

Enclosure:
List of Attendees

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LIST OF ATTENDEES

JUNE 30, 2010, MEETING WITH PROGRESS ENERGY

CONTAINMENT DELAMINATION AND REPAIR ACTIVITIES

U.S. NUCLEAR REGULATORY COMMISSION

Mary Wegner
Farhad Farzan
Arthur Cunanan
Chris Henderson
Brian Harris
Allen Howe
Pat Hiland
Elaine Keegan
Siva Lingam
Scott Stovall
Russ Haskell
George Thomas
Madhumita Sircar
Allen Hiser
Marvin Sykes
Doug Broaddus
Hans Ashar
Raj Auluck
William Jessup
Thomas Weaver
Bob Bernardo
Louis Lake
Syed Ali
Kevin Roche
Joseph Giitter
Eva Brown
Rob Kuntz
Thomas Herrity
David Beaulieu

PROGRESS ENERGY

Stephen Cahill
Ron Knott
Jon Franke
Ernest Kapopuulos
Jessica Lambert
Dan Westcott
Paul Fagan
Garry Miller
Orhan Gurbuz
Don Dyksterhouse
Charles Williams
Brian McCabe
Edward Bird

PUBLIC

Thomas Saporito
Robert Haemer
Chong Chiu
Bill Freebairn

Enclosure

The member of the Public continued by stating that some more destructive testing should be done to ensure no additional hairline cracks exist. The member of the public also stated that he believes the licensee has been very aggressive and thorough in completing the repair activities and wants the NRC to double check the licensee's activities. Another member of the public asked how the licensee is testing the rebar connections between the old and new rebar, and continued by stating he thought that they [Progress Energy] should selectively remove a sample of actual crimped connections in the repair area and test them. Public Meeting Feedback forms were not received.

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/RA/

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	RHaskell, NRR	

ADAMS Accession Nos. PKG ML102110007
Meeting Notice ML101660141 Meeting Summary ML102090335
Handouts ML101940524

OFFICE	DORL/LPL2-2/PM	DORL/LPL2-2/LA	DORL/LPL2-2/BC	DORL/LPL2-2/PM
NAME	JPaige	BCLayton	DBroaddus	JPaige
DATE	7/31/10	7/30/10	8/16/10	8/17/10

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