U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Crystal River Concrete Containment Separation

In September 2009, Crystal River Unit 3 shut down for a planned refueling outage. One of the major outage work activities was to replace their old Steam Generators with new ones. The steam generators are located in the concrete containment building, which houses the reactor. The Crystal River containment is about 42 inches thick, contains both horizontal and vertical tensioned steel tendons, and is lined with a 3/8 inch steel plate. To take out the old steam generators and to move the new ones in, workers needed to create a 25'x27' opening in the side of containment.

On October 2, 2009, while creating the opening, workers discovered an unexpected crack, or separation, inside the concrete wall. They noticed a gap between the outer 10 inches of concrete and the inner concrete. This gap has also been referred to as a delamination. After further excavation of the concrete wall, workers reached the steel liner. The liner was intact and undamaged. The 32 inches of concrete outside the steel liner also appeared unaffected by the delamination. The liner is one of three main barriers designed to protect the public and environment from radiation exposure.

The discovery of this gap in the concrete did not represent an immediate safety concern because the plant was shut down. However, because this issue involved possible adverse generic implications, and because the structural integrity of the containment was not fully known, Region II began a Special Inspection to better understand the issue. This inspection started on October 13, 2009.

The licensee made a voluntary notification to the NRC to describe the containment concrete issues.

Root Cause

The presentation by Progress Energy on June 30, 2010, provided information on the root cause analysis performed by the licensee. The sequence and scope of de-tensioning the steel containment tendons (with a contributing factor of added stress due to removing concrete at the SGR opening) was the root cause. Delamination occurred as a result of outage activities to create an opening for steam generator replacement. In August, the licensee provided the NRC with a root cause report for attachment to the NRC Special Inspection report.

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NRC's Followup Actions

An NRC inspection team was on site for the SGR operations when the issue was discovered, and this team took the lead in the initial NRC investigation. An MD 8.3 evaluation was performed and a Special Inspection Team was chartered to take over the NRC investigation. For details see, Special Inspection Team Charter. The NRC issued a press release on October 10, 2009, to announce the special inspection and purpose.

The NRC and licensee held a public meeting on November 20, 2009, to discuss the status of the issue. See a copy of the licensee presentation and meeting summary for additional information.

A follow up public meeting was held on June 30, 2010, to provide an overview of the root cause analysis and the status of the repair efforts. See the presentation given by Progress Energy, information on the root cause analysis starts on page 14. Also see the meeting summary.

A public conference call meeting was conducted on July 15, 2010, to discuss the licensee's Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.59 approach regarding Crystal River, Unit 3 containment delamination repair activities. For additional information, see the summary of the NRC questions and the meeting summary.

On September 2, 2010, NRC discussed the results of the special inspection in a public meeting. For additional information, see the NRC's presentation, the licensee's presentation and the meeting summary.

For additional information, see our web page on the summary of publicly available documentation relating to the delamination of the Crystal River Unit 3 Containment Building.

On June 27, 2011, Progress Energy Florida provided a press release regarding the status of its Crystal River Nuclear Plant. The company believes that repairing the concrete containment building is the best option, and is taking steps to complete more detailed engineering and construction analyses. At this time, the company estimates that the unit would return to service in 2014.

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