

5037

Franke, Mark

From: Chou, Rich *122*
Sent: Tuesday, October 13, 2009 10:46 AM
To: Bagchi, Goutam; Bernardo, Robert; Lee, Brian; Dozier, Jerry; Medoff, James; Lee, Samson; Tabatabai, Omid
Cc: Chokshi, Nilesh; White, John; Farzam, Farhad; Thomas, George; Franke, Mark; Lake, Louis; Chou, Rich
Subject: RE: OpE Item on Crystal River Containment - update

Goutam:

The liner plate is 3/8 inch. The concrete is 42 inches.

Rich Chou
Region II Lead Steam Generator Replacement Inspector

From: Bagchi, Goutam *NRO*
Sent: Tuesday, October 13, 2009 7:59 AM
To: Bernardo, Robert; Lee, Brian; Dozier, Jerry; Medoff, James; Lee, Samson; Tabatabai, Omid
Cc: Chokshi, Nilesh; White, John; Chou, Rich; Farzam, Farhad; Thomas, George
Subject: RE: OpE Item on Crystal River Containment - update

To the TRG Structural Group Community:

Yesterday's Inside NRC has an article on the Crystal River containment crack , although I am not sure that they quoted the steel liner thickness correctly ("Lambert said Crystal River-3's containment has a 3-inch steel liner and 42-inch-thick concrete"). If the liner is 3 inch thick, the liner itself is sufficient to serve as a containment structural element and nothing else is needed.

The crack appears to be at the outside hoop tendon layer where concrete is essential for providing compression. Assuming that the crack was caused by delamination, it had to be pre-existing. They are conducting or going to conduct NDE to determine the extent of the crack. Another type of examination of the contour and topological measurement of the available outside surface of pre-stressed concrete containment should reveal very small deviations of the smooth surface as an indication of delamination crack. 3-D contour imaging techniques could be explored here. An important point is that the examinations should not be limited to the segment of the containment between the 120 degree segment where the opening for steam generator removal was cut. This is probably the segment between the hoop tendon anchoring piers.

Thank you,
Goutam Bagchi
Leader, Structural TRG
301-415-3305

From: Bernardo, Robert *NRO*
Sent: Friday, October 09, 2009 2:46 PM
To: Bagchi, Goutam; Lee, Brian; Dozier, Jerry; Medoff, James; Lee, Samson; Tabatabai, Omid
Subject: OpE Item on Crystal River Containment - update

The following updated OpE item is being passed along from the OpE Clearinghouse Screening Summary for October 9, 2009

Information in this record was deleted in accordance with the Freedom of Information Act.
Exemptions: Outside of scope
FOI/PA 2010-0116

G-14

Crystal River - Crack on Exterior Containment Wall (10/5) - Update

(From DORL PM and Region II notes) NRC call with licensee: On Thursday afternoon, October 8, 2009, NRC Region II led a teleconference with Crystal River for them to discuss their actions to date, their strategy for addressing the identified crack in containment, and ongoing analyses being performed by Crystal River and vendors. Representatives from Research, OPA and NRR DE, DLR, DORL and IOEB also tied into the call.

The following items were discussed:

- In the near future, the licensee will complete a failure analysis and root cause analysis, although no specific date has been set for completing this. The analyses mentioned above have all been entered in their corrective action program for tracking. The licensee plans to determine how far the crack has propagated using non-destructive techniques. To assist in their analyses, the licensee has requested support from various vendors (MPR, Sargent & Lundy, and Bechtel). They have also outreached to NEI and INPO for assistance. Until the licensee has completed its failure and root cause analyses, they will not know their path forward with regards to licensing action(s) needed (i.e., license amendment request). The licensee will need to declare the containment operable before they transition to Mode 4, which is tentatively scheduled for early December 2009. The licensee stated that once they obtain additional or any new information, they will notify the NRC immediately.
- The licensee detensioned 10 vertical tendons (of ~144) and 17 horizontal tendons (of ~282) in preparation for the hydro-demolition.
- Each horizontal tendon extends 120 degrees around the cylinder.
- The separation is about one-half inch wide and appears to be located in the concrete about nine inches from the outer surface. The separation was found near the horizontal tendons. No problems have been noted with the steel liner.
- No patterns of relaxed tendons had been seen from a review of the data from surveillances of containment tendons.
- In preparation for the hydro-demolition, the licensee had performed an operating experience search of issues that resulted from replacing SGs through a removed section from containment. The licensee only identified voiding issues in the containment and set forth contingency plans to address potential voiding issues.
- There have been no media reports on the crack issue to date. There were two phone calls related to the hydro-demolition activity.
- The region will be conducting a special inspection starting on Tuesday, October 13, 2009. The NRC special inspection will continue for several weeks during the plant's outage and the plant will not restart until the agency is satisfied that the analyses and all work completed provide the required safety margin. When the inspection is completed, the inspectors will meet in a public setting near the plant to discuss their preliminary findings. The team will also issue a written report, available to the public, several weeks after the completion of the inspection. The region (special inspection team) will be the lead on this issue as well as serve as the NRC point of contact for the licensee. NRR will support the inspection by sending an experienced structural engineer to Crystal River.
- The region issued a press release on 10/8 to announce the special inspection and purpose (<http://www.nrc.gov/reading-rm/doc-collections/news/2009/09-055.ii.html>).
- Following construction, the building was subjected to a one-time structural integrity test of 115% of the original design pressure. A containment pressure test that simulates accident pressure conditions was last performed in 2005 and was successful.
- In 1976, Crystal River repaired a concrete delamination, or separation, issue affecting the dome. A containment structural integrity test was successfully performed after the repair.

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From: Bernardo, Robert *MR*
Sent: Thursday, October 08, 2009 2:53 PM
To: Bernardo, Robert; Bagchi, Goutam; Lee, Brian; Dozier, Jerry; Medoff, James
Subject: OpE Item on Crystal River Containment - update

out of scope

1. Crystal River - Crack on Exterior Containment Wall (10/5) - Update

Outside of Scope

Containment Hydro-demolition of concrete was completed. Licensee is planning to perform a modification to support an outside lift system as a result of cracks identified in concrete. A root cause investigation is in progress. Sargent and Lundy is involved with the investigation and corrective actions. An NRC/Licensee conference call to discuss the containment issues and licensee actions is scheduled for today at 15:00. The concrete around the containment liner is nominally 42 inches thick. The cracks (see linked pictures in [PITA CR Containment Pic1 10-8.jpg](#); [CR Containment Pic 2 10-8.jpg](#); [CR Containment Pic 3 10-8.jpg](#) - **treat these pictures as Official Use Only**) are located in the area of the horizontal tendons, leaving at least 30 inches of concrete between the containment liner and the crack. The licensee analysis is continuing with the assumption that the crack is around the entire 360 degree circumference, and the full height of the structure is affected.

Region has determined that the designer of the CR containment (Gilbert Associates) also designed the containments at VC Summer, Perry, TMI and Ginna. Region II has confirmed that VC Summer has been in contact with CR to discuss this issue. Region II has alerted Regions I and III. (NOTE: VC Summer confirmed that they did NOT have to cut a hole in containment to perform a steam generator replacement in the past. Ginna performed a SG replacement in the 1990s where containment was cut, and TMI has an upcoming refueling outage where SGs will be replaced.)

The region plans on performing a special inspection at Crystal River, regarding the containment crack, tentatively starting on Monday, October 12, 2009.

Yesterday the licensee made a voluntary notification to the NRC to describe the containment concrete issues (**EN 45416**). Note: This issue was screened in as an Issue for Resolution on 10/6/2009

In addition, IOEB noted the following in the CR FSAR:

Excerpts from Crystal River FSAR:

The design and construction of the reactor building has been given a thorough re-evaluation subsequent to the discovery on April 14, 1976, of a delaminated condition in the dome. The upper part (approximately 12 inches thick) of the 3 feet design concrete thickness separated from the lower part of the dome structure parallel to the membrane over an approximate diameter of 105 inches. Extensive analytical and field investigations were conducted to establish an acceptable repair program. This repair program included removal of the upper part of the dome, placement of non-prestressed reinforcing steel mats, installation of radial reinforcement, and placement of concrete to restore the dome to a thickness of 3 feet. Details of the delaminated condition of the dome, reevaluations of the dome, and the dome repair program are described in the report: "Final Report - Reactor Building Dome Delamination", December 10, 1976.

The Reactor Building is similar in design to the containment buildings for the Three Mile Island Nuclear Station Unit 1 (Docket No. 50-289), the Turkey Point Plant (Docket Nos. 50-250 and

251), the Palisades Plant (Docket No. 50-255), the Point Beach Plant (Docket No. 50-226), and the Oconee Nuclear Station (Docket Nos. 50-269, 50-270, and 50-287).

IOEB is obtaining a copy of the final report noted in the FSAR from the ADAMS legacy library (ECD 10/14). Assuming the size doesn't prohibit it, we'll share copies when we get the report. Region stated the list they provided was based on the same AE firm, thus the difference with the FSAR.

Also found an interesting item via Google on the Kaiga plant, in India. Attached copies FYI. We got some additional pictures, which I'll send under a separate e-mail

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From: Bernardo, Robert *NRR*
Sent: Wednesday, October 07, 2009 3:08 PM
To: Bernardo, Robert; Bagchi, Goutam; Lee, Brian
Subject: OpE Item on Crystal River Containment - update

out of scope

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The following updated OpE item is being passed along from the OpE Clearinghouse Screening Summary for October 6, 2009

Crystal River - Crack on Exterior Containment Wall (10/5) - Update

Outside of Scope

Outside of Scope

Hydro-demolition of containment concrete is completed. Licensee planning to perform a modification to support outside lift system to account for cracks identified in containment concrete. A root cause investigation is in progress. Sargent and Lundy is involved with the investigation and corrective actions. Licensee conference call scheduled for tomorrow (10/8) to discuss the lift system modification with the NRC as well as a status update of their efforts. Currently an NDE inspection is being performed to quantify the crack to determine what needs to be done for containment to be declared operable. Containment needs to be operable by Mode 4 which is scheduled for December 2009.

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From: Bernardo, Robert *NR*
Sent: Tuesday, October 06, 2009 2:34 PM
To: Bagchi, Goutam; Lee, Brian; Lee, Samson; Dozier, Jerry; Medoff, James; Burnell, Scott
Subject: OpE Item on Crystal River Containment

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out of scope

The following OpE item is being passed along from the OpE Clearinghouse Screening Summary for October 6, 2009

Crystal River - Crack on Exterior Containment Wall (10/5) - Update

out of scope

Outside of Scope

Hydro-demolition for the containment opening continues. Licensee will perform a modification to support outside lift system as a result of the crack identified in concrete. A root cause investigation is in progress. Sargent and Lundy is involved with the investigation and corrective actions, as well as operability and functionality determinations.

The licensee believes that the crack in the concrete on the containment exists all the way around the containment and all the way up and down (360 degrees, full height of containment). This is per site VP discussion with Region II. Crack was found while making an approximately 25 ft X 25 ft concrete cut for the Steam Generator Replacement project. All indications are that the liner is still intact, and there are no indications of liner problems. Crack is about 1/2 inch wide and 10 inches in from outside edge of concrete - running around the containment - located just at the layer of horizontal tendons. Licensee is assessing and evaluating implications (polar crane support, S/G lift device support, as well as operability of containment).

Outside of Scope

The licensee was contacted by the State of Florida DEP Coordinator and asked whether they were in an unusual event due to contaminated water leaking from a crack in containment. The licensee corrected the misinformation and MAY contact the local press to inform them of the RB crack issue to preclude any further misunderstandings.

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out of scope, NA