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**Hernandez, Pete**

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**From:** Hernandez, Pete *MPK*  
**Sent:** Thursday, December 15, 2011 7:18 AM  
**To:** Erickson, Alice  
**Subject:** FW: ET/LT Brief 12-22-11 - Containment Delamination Davis-Besse / CR-3  
**Attachments:** 12142011 ET-LT Containment Delamination Brief 12-22-11.pptx

Hi Alice,

Bryce had you listed as his back up for this briefing. Let me know if I can do anything else.

Thanks,

Pete

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**From:** Hernandez, Pete  
**Sent:** Thursday, December 15, 2011 7:16 AM  
**To:** Lehman, Bryce  
**Cc:** Mahoney, Michael  
**Subject:** FW: ET/LT Brief 12-22-11 - Containment Delamination Davis-Besse / CR-3

Good morning Bryce,

Attached is the ppt. with comments from the region. Let me know if you need anything else.

Thanks,

Pete

*B/48*

# CONTAINMENT DELAMINATION: DAVIS-BESSE & CRYSTAL RIVER

BRYCE LEHMAN

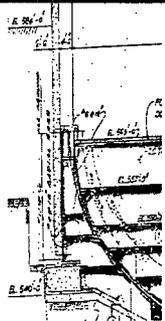
December 27, 2011

## Agenda

- Davis-Besse Condition & Licensee's Position
- NRC's Position on Davis-Besse
- Impact on License Renewal
- Status Update on Crystal River
- Impact on License Renewal
- Similarities & Differences Between Plants

## Davis-Besse Shield Building

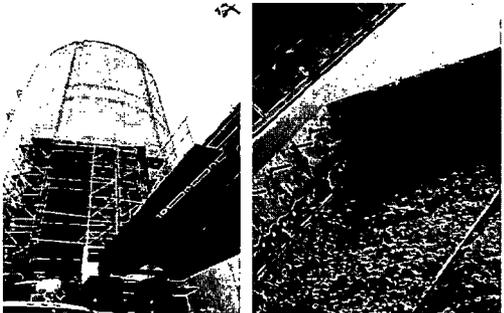
- Free-standing steel containment vessel surrounded by reinforced concrete shield building
- Shield Building Functions:
  - Environmental & external missile protection for containment vessel
  - Biological shielding during normal operation and accident conditions
  - Means for collection and filtration of fission product leakage following accident



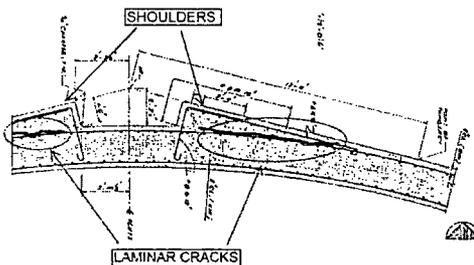
## Initial Condition

- Laminar crack identified in architectural flute shoulder area during hydro-demolition for replacement of reactor vessel closure head (October 10<sup>th</sup>)
- Crack found on the vertical side of the opening (left side, looking from the outside), generally along main reinforcing steel, and extends ~6' across the top and ~4' across the bottom

## Construction Opening



## Flute/Shoulder Geometry



## Condition Assessment

### Initial Investigation

- "Chipping back" along cracked areas revealed crack extended beyond construction opening
- Impulse Response (IR) methodology employed to investigate extent of crack
- IR testing indicated crack extended ~38' above construction opening
- (4) core bores taken to validate IR results
  - Indicated crack existed near outer reinforcement mat

### Flute Shoulders

- IR testing performed on 15 of 16 flute shoulders
  - Based on results, licensee assumed cracking throughout all shoulders
- Core bores taken on 12 shoulders to confirm crack boundaries
- Core bores inspected using boroscope to identify crack depths and widths
  - Very tight, less than 0.01"

## Condition Assessment

### Flute Areas

- IR testing performed on 4 of 8 flute areas
- Core bores taken from 6 of 8 flute areas
- IR testing and core bores confirmed laminar cracking not present in flute areas
  - One flute did have a vertical crack, but determined to be isolated condition

### Main Shell Areas

- IR testing performed in 7 of 8 areas between flute shoulders
- Two small regions adjacent to Main Steam Line penetration blockouts are cracked
  - Extent of cracking unique to penetrations
- Cracking regions exist at top 20' of Shield Building wall outside shoulder area
- Spring line area appears to have little or no cracking (top 5')

## Condition Assessment Summary

- Cracking is generic to all flute shoulder regions
- Cracks are confined to flute shoulder regions with exception of top 20' of Shield Building wall and two small regions near MSL penetrations
- Cracking exists at top 20' of Shield Building wall outside shoulder region [delete (investigation ongoing)]
- Cracks are very tight, <0.01", and located near the outer reinforcing mat

## Licensee's Position

- Believe sampling method of IR testing and core bores has characterized the extent of cracking in the structure
- Primary concern is ability of outside rebar to perform its intended function. Observations of construction opening and testing indicate concrete is attached to rebar mat
- Based on structural evaluation, cracking does not impact ability of structure to perform its intended safety functions
- Root cause is underway

## NRC's Position

- NRC informed licensee they could restart (12/2)
  - Licensee developed a model with reasonable assumptions which demonstrated adequate margin for operability
  - Staff continues to evaluate whether the shield building conforms to the design code requirements in the CLB
    - This requires a 50.59 review and is currently being addressed by Region III in inspection space
    - IS THERE A DUE DATE OR TIME LIMIT ON THIS? WHAT IS DRIVING THIS REVIEW?
    - The ongoing inspection is continuing and the focus has shifted to resolving the question regarding compliance with the design and licensing basis. Region III is developing a plan/timeline for resolution and issuance of the inspection report.

## NRC's Position

- NRC issued CAL which included commitments to:
  - Determine root cause and develop a long-term monitoring program (due 2/28/12)
  - Select multiple un-cracked areas to investigate to verify the cracking is not spreading (due 90 days)
  - Analyze known cracked areas to verify the cracks are not growing
- Decision was made to leave code compliance questions out of the CAL and to focus on confirming assumptions made in the operability calculations
  - Focus on continued operability going forward
  - Address design through ongoing inspection

### License Renewal Impact

- The degraded shield building is a Part 50 issue affecting license renewal
- DLR needs to understand if the degradation is age-related, and if so how it will be managed
- DLR will issue an RAI asking the applicant to explain how the unique OE will be addressed by its AMPs
  - This will be tracked as an Open Item in the SER

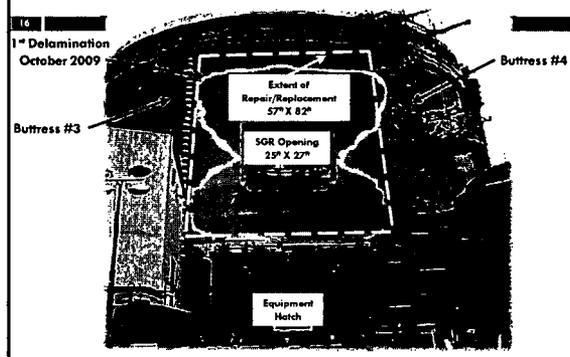
### CR-3 Update: Timeline

- **Dec. 2008:** License Renewal Application (LRA) submitted.
- **Oct. 2009:** Delamination of containment concrete in Bay 3-4.
- **Nov. 2009:** Applicant starts repair of concrete in Bay 3-4.
- **Dec. 2010:** SER issued with open item for containment repair.
- **Jan. 2011:** ACRS Subcommittee meeting.
  - \* Committee requested additional meeting after closeout of open item for containment repair.
- **Mar. 2011:** New delamination identified in containment Bay 5-6.
- **Jun. 2011:** NRC informs the applicant that a revised schedule for LRA review will be established after information on the containment repair plan is submitted.
- **Jul. 2011:** Spalling identified in Bay 1-2.
  - \* Concrete sections (approx. 1.5" X 12' X 3' & 5') fell on Intermediate Building

### CR-3 Update: Recent Activities

- Licensee reviewing repair proposals from Bechtel and URS
  - Anticipate contracts to be in place by Jan. 31
  - Repairs expected to require 2 to 3 years to complete
- Licensee continues to install temporary anchors to limit propagation of delaminations and prevent future delaminations
- Licensee preparing to detension the containment building tendons in preparation for the repair
- Staff expects licensee to submit a license amendment but that is not certain at this point

### CR-3 Update: Original Delamination

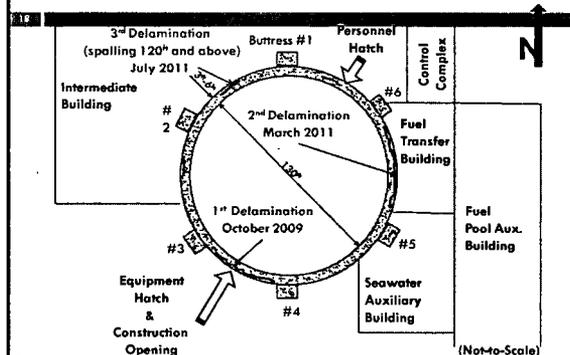


### CR-3 Update: Original Delamination



Delamination between buttress 3 & 4

### CR-3 Update: Plant View



### CR-3 Update: Possible Impacts on LR-AMPs

Program	Impact
IWL	Concrete and prestressing tendons: Enhanced inspection and surveillance frequency; additional devices such as strain gauges to monitor cracks; and scanning of concrete at different locations.
10 CFR 50 App. J	Containment Leakage Type A, B, and C tests: Test frequency.
TLLA	Tendons: Revision to the program and data since most of the vertical and hoop tendons will be re-tensioned.
Containment Tendon Prestress	Tendons: Major revision to the program to identify sample size, frequency; new regression analysis based on re-tensioned data.

### Comparison of Davis-Besse & CR-3

- Similar crack geometry
  - Laminar cracking around circumference of building
- Similarities end there

### Differences Between Davis-Besse and CR-3

Davis-Besse	Crystal River
<ul style="list-style-type: none"> <li>□ Cracking in the reinforced concrete shield building</li> <li>□ Crack widths between 5 – 10 mils</li> <li>□ Cracking along outer reinforcement mat (2-3" from exterior face)</li> <li>□ Root cause still under investigation                             <ul style="list-style-type: none"> <li>□ Potential causes: thermal loading and structural discontinuities</li> <li>□ OK for <del>examples</del> of likely causes if NRC internal presentation. Licensee likely will investigate other potential causes in their root cause evaluation.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>□ Cracking in the prestressed concrete containment building</li> <li>□ Crack widths between 500 – 4000 mils</li> <li>□ Cracking along post-tension tendons (8-9" from exterior face)</li> <li>□ Cracking due to prestressing forces, lack of transverse shear reinforcement and weak aggregate</li> </ul>

### Summary

- Although similar at first glance, Davis-Besse and Crystal River are different issues
  - Acceptance of one has no bearing on the other.
- Both issues are Part 50 concerns which have an impact on license renewal
- The Regions and Headquarters will continue to work together to ensure continued functionality (Part 50) and to ensure aging is properly managed (Part 54)