

SHIELD BUILDING / CONTAINMENT DELAMINATION: DAVIS-BESSE & CRYSTAL RIVER

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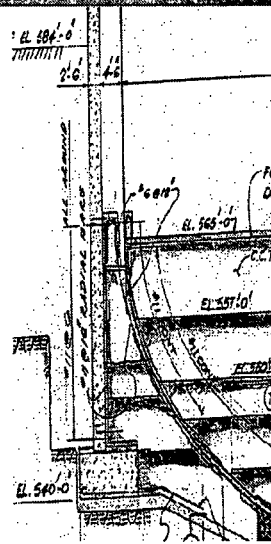
Agenda

- 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

B/49

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 10th)
- 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

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
- 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 it could restart (12/2)
 - Licensee developed a model with reasonable assumptions which demonstrated a reasonable expectation of operability.
 - Staff continues to evaluate whether the shield building conforms to the design code requirements in the CLB
 - This is currently being addressed by Region III in inspection space.
 - The inspection is ongoing 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

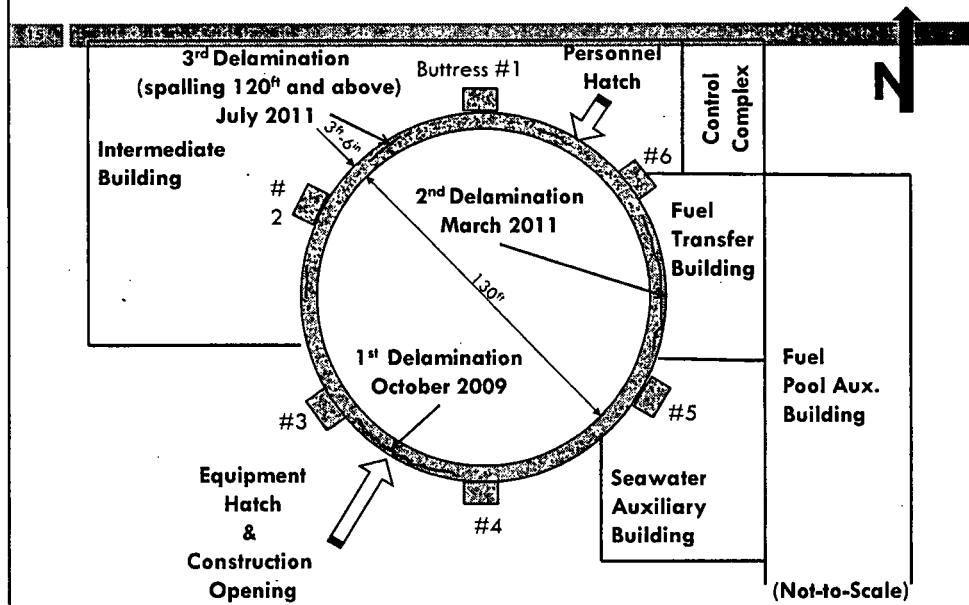
License Renewal Impact

- 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 Aging Management Programs (AMP)
 - 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.
- **Mar. 2010:** 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 and delamination identified in Bay 1-2.
 - Concrete sections (approx. 1.5' x 12' x 3' & 5') fell on Intermediate Building

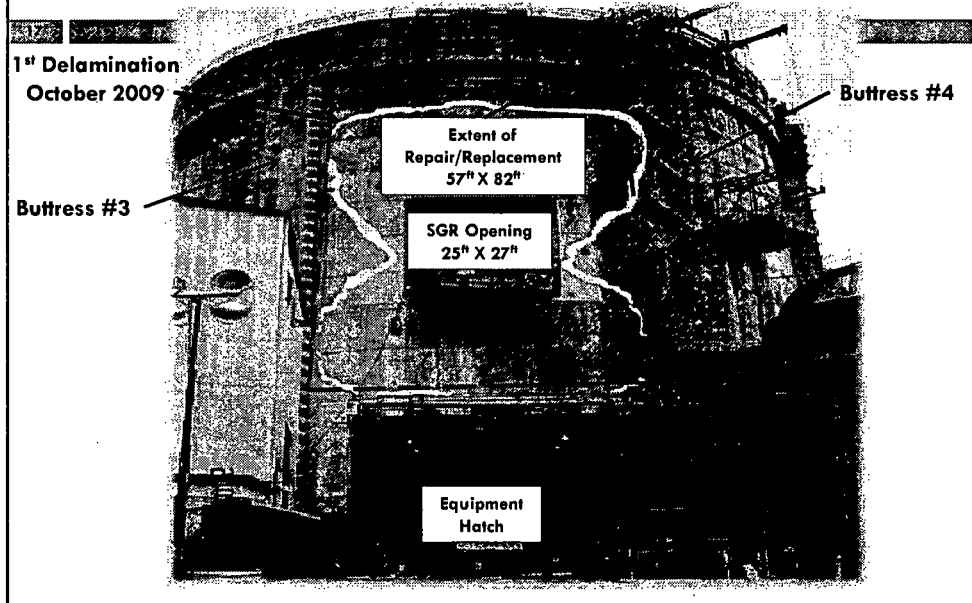
CR-3 Update: Plan View



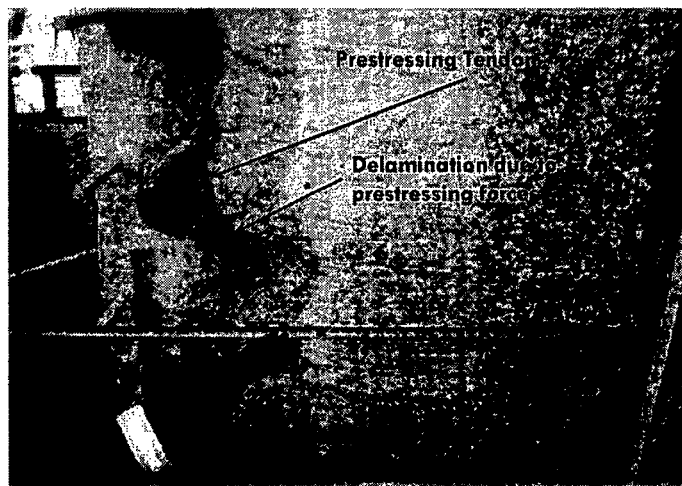
CR-3 Update: Recent Activities

- 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
 - ▣ Detensioning currently on hold – will be included as part of the repair contract
- Licensee installed temporary anchors to limit propagation of delaminations and prevent future delaminations
- Staff expects licensee to submit a license amendment but that is not certain at this point
- Region II planning appropriate inspections during demolition, repair and testing

CR-3 Update: Original Delamination



CR-3 Update: Original Delamination



Delamination between buttress 3 & 4

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

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Davis-Besse

- Laminar cracking in the **reinforced concrete shield** building
- Crack widths between 5 – 10 mils
- Cracking along outer reinforcement mat (2-3" from exterior face)
- Root cause still under investigation

Crystal River

- Laminar cracking in the **prestressed concrete containment** building
- Crack widths between 125 – 2750 mils
- Cracking in the plane of horizontal prestressing tendons (8-9" from exterior face)
- Cracking due to redistribution of prestressing forces, weak aggregate, and lack of radial reinforcement

Summary

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- 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)