

**UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION**

**Before the Atomic Safety and Licensing Board**

In the Matter of	)	Docket No. 50-346-LR
First Energy Nuclear Operating Company	)	
(Davis-Besse Nuclear Power Station, Unit 1)	)	August 17, 2012
.	)	

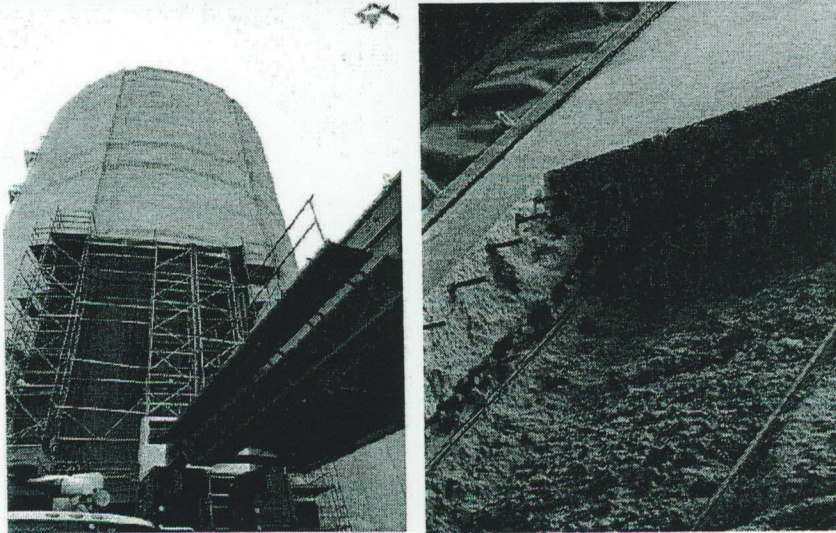
\* \* \* \* \*

**INTERVENORS' FIFTH MOTION TO AMEND AND/OR SUPPLEMENT PROPOSED  
CONTENTION NO. 5 (SHIELD BUILDING CRACKING)**

*APPENDIX VIII: NRC FOIA RESPONSES (B-49  
THROUGH B-50)*

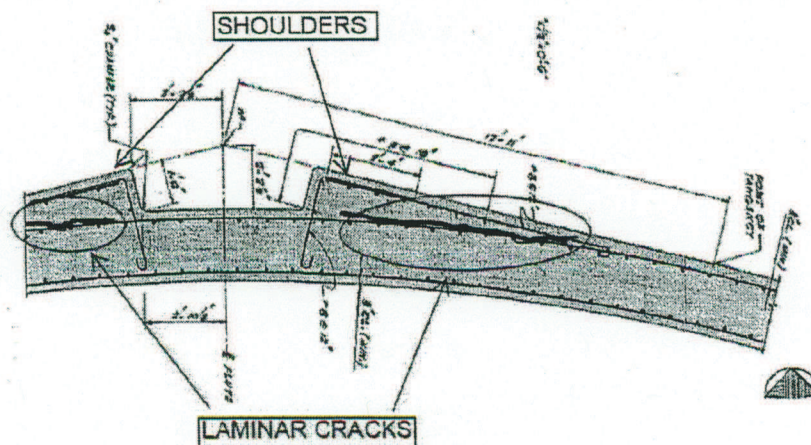
## Construction Opening

5



## Flute/Shoulder Geometry

6





## Condition Assessment

7

### 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

8

### 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

9

- ☐ 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

10

- ☐ 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

11

- 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

12

- 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

13

- 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

14

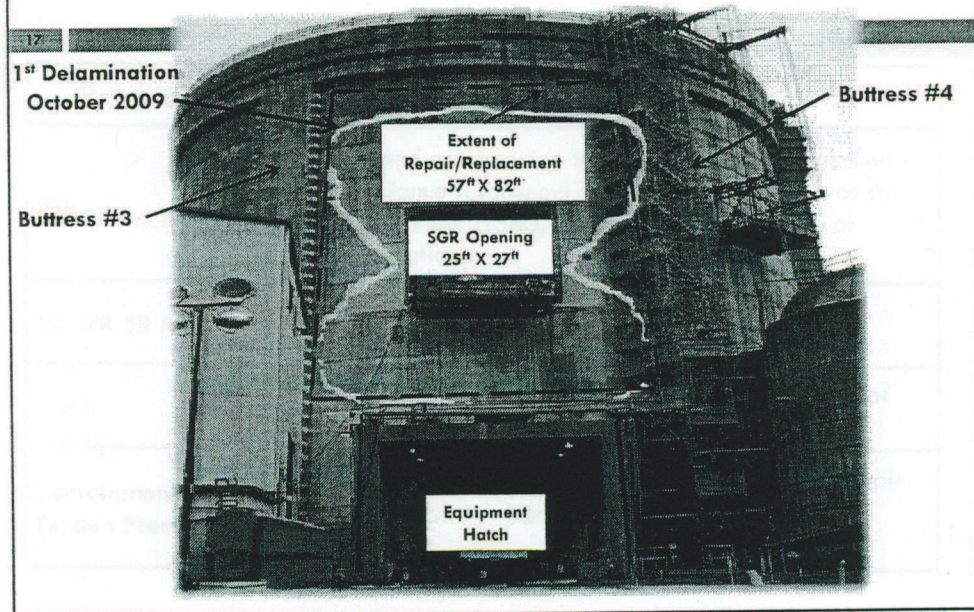
- **Dec. 2008:** License Renewal Application (LRA) submitted.
- **Oct. 2009:** Delamination of containment concrete in Bay 3-4.
- **Mar. 2010:** Applicant starts repair of concrete in Bay 3-4.
- **Dec. 2010:** SER issued with open item for containment repair.
- **Jan. 2011:** ACRS Subcommittee meeting.
  - 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



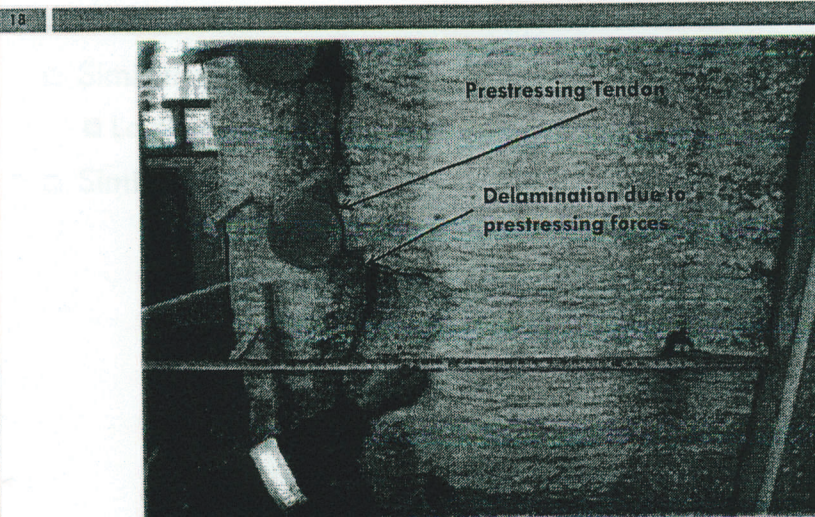




## CR-3 Update: Original Delamination



## CR-3 Update: Original Delamination



Delamination between buttress 3 & 4



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

19

Program	Impact
IWL	<b>Concrete and prestressing tendons:</b> 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	<b>Containment Leakage Type A, B, and C tests:</b> Test frequency.
TLAA	<b>Tendons:</b> Revision to the program and data since most of the vertical and hoop tendons will be re-tensioned.
Containment Tendon Prestress	<b>Tendons:</b> Major revision to the program to identify sample size, frequency; new regression analysis based on re-tensioned data.

## Comparison of Davis-Besse & CR-3

20

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

## Differences Between Davis-Besse and CR-3

21

### 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

22

- 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)



50

**CuadradoDeJesus, Samuel**

**From:** Morey, Dennis *mk*  
**Sent:** Thursday, January 12, 2012 4:51 PM  
**To:** Galloway, Melanie; Delligatti, Mark  
**Cc:** Auluck, Rajender; CuadradoDeJesus, Samuel; Sheikh, Abdul; Davis-BesseHearingFile Resource; Harris, Brian; Subin, Lloyd; Kanatas, Catherine  
**Subject:** FW: Summary of meeting with OGC to discuss Davis Besse's new contention on the shield building crack  
**Attachments:** Davis-Beese Sheild Building Contention.pdf  
**Importance:** High

Melanie and Mark,

Sam Cuadrado, Abdul Sheikh and I met with OGC today to discuss the new Davis-Besse contention on the shield building cracks. Since DLR has a documented concern with the cracks, OGC does not want to oppose the contention but will instead propose a revised contention that focuses on the license renewal safety issue: the adequacy of the AMP to address age-related cracking in the shield building. We agreed and will support developing a revised contention.

Thanks,

**Dennis Morey**

---

**From:** CuadradoDeJesus, Samuel *mk*  
**Sent:** Thursday, January 12, 2012 4:34 PM  
**To:** Morey, Dennis  
**Cc:** Sheikh, Abdul; Davis-BesseHearingFile Resource  
**Subject:** Summary of meeting with OGC to discuss Davis Besse's new contention on the shield building crack  
**Importance:** High

Dennis,

**Summary of Meeting with OGC to discuss Davis Besse's New Contention No. 5 on the Shield Building Crack**

On January 10, 2012, a "Motion for Admission of Contention No. 5 on Shield Building Cracking" for Davis-Besse was submitted before the Atomic Safety and Licensing Board (ASLB). The new Contention No. 5 reads as follows:

***Contention 5: Cracked Shield Building/Secondary Reactor Radiological Containment Structure***

*Intervenors contend that FirstEnergy's recently-discovered, extensive cracking of unknown origin in the Davis-Besse shield building/secondary reactor radiological containment structure is an aging-related feature of the plant, the condition of which precludes safe operation of the atomic reactor beyond 2017 for any period of time, let alone the proposed 20-year license period.*

Per request of Brian Harris (OGC lawyer) a meeting was scheduled to discuss with the technical staff the merits of the contention. The meeting was held on January 12, 2012, and the participants were the following:

- Brian Harris (OGC)
- Lloyd Subin (OGC)

*B* / 50



- Catherine Kanatas (OGC)
- Abdul Sheikh
- Dennis Morey
- Samuel Cuadrado

During the meeting Abdul Sheikh presented and explained to OGC (1) the sequence of events since the discovery of the cracks on October 2011 and (2) the technical concerns within the scope of license renewal associated with the shield building cracks. The staff also pointed out that an RAI was issued on December 2011 (RAI B.2.39-13) requesting the applicant to provide the shield building cracks root cause and to explain whether the Structures Monitoring Program AMP, will be adequate to manage aging of the shield building during the period of extended operation. The staff also stated that the applicant will provide information on the root cause by the end of February 2012. The staff further stated that an assessment on the adequacy of an AMP won't be possible until we receive the applicant's determination of the root cause and proposed AMP.

Given the information provided by the staff, OGC does not want to oppose Contention No. 5 but will propose rewording it. OGC will prepare a revised contention that reflects a concern with the adequacy of the Structures Monitoring Program AMP to address the shield building cracks. OGC will provide the staff with a draft revised contention in order to receive comments and feedback before submitting the February 6 ASLB response. The DLR PM will contact Region III inspectors and related LR supporting staff to keep them up to date with the discussions associated with OGC and Contention No. 5.

Thanks,

**Samuel Cuadrado de Jesús**

Project Manager

Projects Branch 1

Division of License Renewal

U.S. Nuclear Regulatory Commission

Phone: 301-415-2946

[Samuel.CuadradoDeJesus@nrc.gov](mailto:Samuel.CuadradoDeJesus@nrc.gov)