



# Union of Concerned Scientists

Citizens and Scientists for Environmental Solutions

November 4, 2011

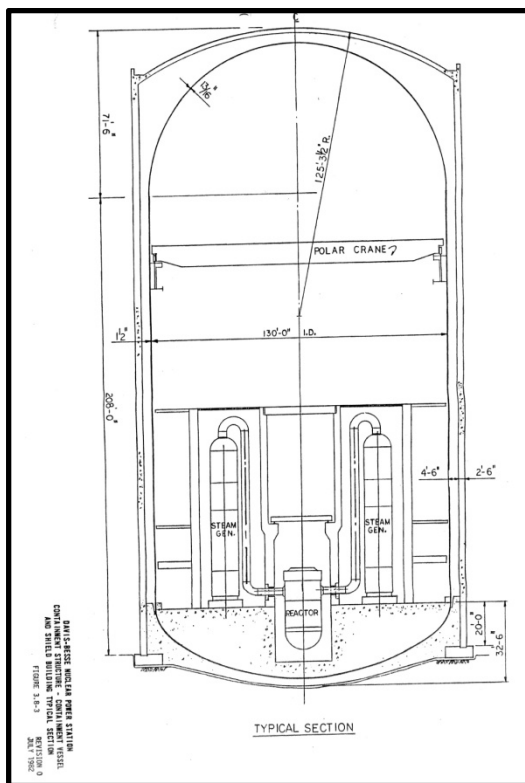
Cynthia Pederson, Regional Administrator (Acting)  
U.S. Nuclear Regulatory Commission Region III  
2443 Warrenville Road  
Suite 210  
Lisle, IL 60532-4352

Via email to [Cynthia.Pederson@nrc.gov](mailto:Cynthia.Pederson@nrc.gov)

## SUBJECT: Conditional Allegation – Shield Building Design at Davis-Besse

Dear Ms Pederson:

The purpose of this letter is to ask questions concerning the design evaluation and analysis of the shield building at the Davis-Besse nuclear plant. However, if the NRC's processes cannot support answering these questions before the plant restarts, please treat them as allegations.

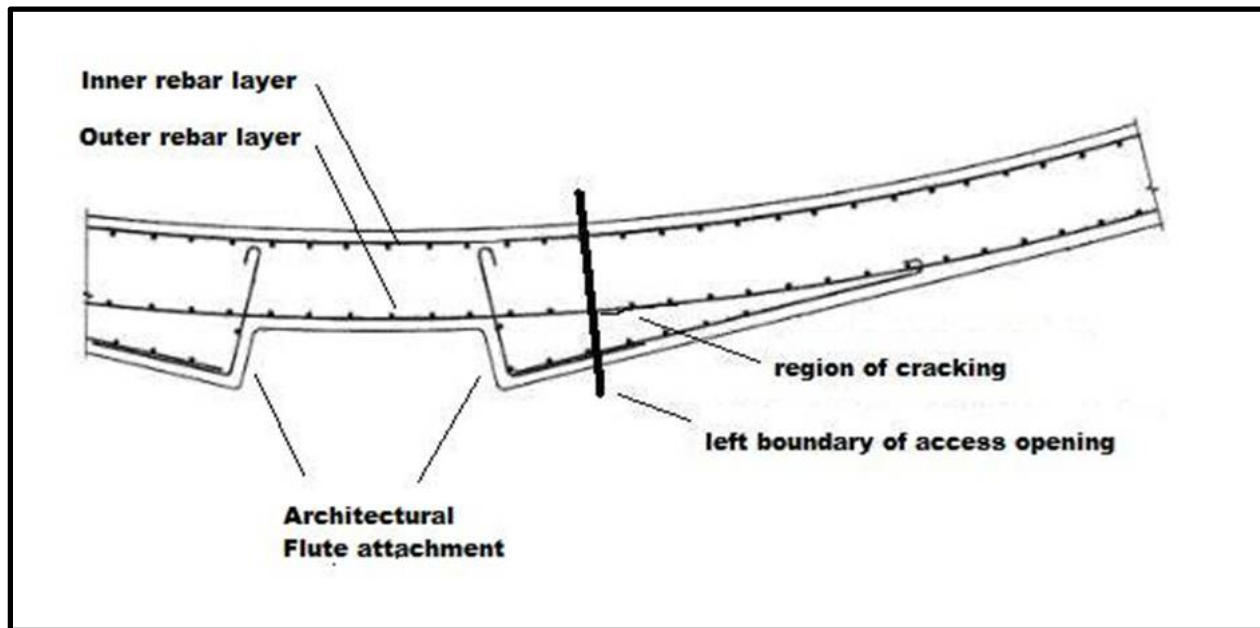


### BACKGROUND

Updated Final Safety Analysis Report (UFSAR) section 3.8.2.2 summarizes the design and associated analyses for the shield building. UFSAR section 3.8.2.2.2 states that dead loads were considered in the shield building design. UFSAR section 3.8.2.2.4 states that the dead loads included concrete (143 pounds per square foot) and steel reinforcing (489 pounds per square foot). UFSAR section 3.8.2.3.7 states that "Cement for all concrete except the Shield Building is Type II low alkali cement ... The Shield Building has Type I cement above grade." UFSAR Figure 3.8-3 (left) illustrates a typical section of the containment vessel and shield building.

The NRC's PNO-III-11-014 (ML11293A092) dated October 20, 2011 stated:

*The reactor vessel closure head is bolted on top of the reactor vessel which is located inside a 1.5 inch thick steel containment vessel surrounded by a 2.5 foot thick free-standing, reinforced concrete, shield building. The majority of the shield building vertical exterior has additional non-structural, architectural concrete up to 1.5 foot thick separated by grooves.*



This plan diagram (overhead view) of a section of the shield building wall shows the “non-structural, architectural concrete” referred to in the NRC’s PNO. As indicated by the two fish-hook shaped devices in the drawing, the attachments are anchored to the shield building wall.

The media has reported that numerous cracks in the “non-structural, architectural concrete” have been identified. The NRC PNO stated “If there are any challenges identified to the design function of the shield building they will have to be resolved before the plant restarts.”

## QUESTIONS

1. The “non-structural, architectural concrete” elements do not appear in UFSAR Figure 3.8-3. The plan diagram indicates these elements are connected to the shield building wall. Are the dead loads from these concrete elements properly considered in the design analyses of the shield building?
2. The UFSAR does not explicitly describe these “non-structural, architectural concrete” elements. Thus, it is not clear if these elements have Type II concrete or Type I cement as explained in UFSAR section 3.8.2.3.7. What type of cement was used in the “non-structural, architectural concrete?”
3. If the concrete/cement in the shield building is the same as that in the “non-structural, architectural concrete” elements and all have the same age and environmental exposure history, would numerous cracks identified in one suggest comparable conditions in the other? If not, why not?

UCS realizes that UFSAR Figure 3.8-3 is a simplified drawing and the design analysts hopefully used the more detailed civil/structural arrangement drawings, but it is prudent to check to verify

it. Recall that the NRC team conducting the design inspection at the DC Cook nuclear plant in summer 1997 found that design analysts had failed to consider a wall inside containment that caused their calculations of water inventory available during the recirculation phase of an accident to be significantly non-conservative. Holes had to be cut through that wall to assure that adequate water inventory would be available.

UCS also understands that the numerous cracks, even if also within the shield building's walls, do not in themselves demonstrate that the design function has been compromised. But there's little reason that numerous cracking found in the "non-structural, architectural concrete" would not also be found in the shield building concrete unless (a) a different type of concrete was used, or (b) no one looked at the shield building concrete.

#### **CONDITIONAL ALLEGATIONS**

UCS would prefer that the NRC answer the questions above before Davis-Besse restarts. But we realize that the NRC may lack the process and means to do so. If that is the case, please consider the following two items with the agency's allegations program:

1. The design evaluation and analysis for the shield building did not properly consider the dead load from the "non-structural, architectural concrete" attached to it.
2. The shield building wall was not sufficiently examined for indication of cracking.

Sincerely,



David Lochbaum  
Director, Nuclear Safety Project  
PO Box 15316  
Chattanooga, TN 37415  
(423) 468-9272, office  
(423) 488-8318, cell