

**UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION**

In the Matter of:	)	Docket No. 50-346-LR
FirstEnergy Nuclear Operating Company	)	April 21, 2014
Davis-Besse Nuclear Power Station, Unit 1	)	
	)	

**MOTION FOR ADMISSION OF CONTENTION NO. 6  
ON SHIELD BUILDING CONCRETE VOID, CRACKING AND  
BROKEN REBAR PROBLEMS**

Now come Beyond Nuclear, Citizens Environment Alliance of Southwestern Ontario (CEA), Don't Waste Michigan, and the Green Party of Ohio (collectively, Intervenors), by and through counsel, and move for the admission of a new Contention No. 6 concerning recent plant-specific problems with the reactor shield building at the Davis-Besse Nuclear Power Station, Unit 1 ("Davis-Besse").

Specifically, in February 2014 there was a large concrete void discovered within the concrete-and-rebar wall of the Davis-Besse shield building. In August and September 2013, about 15 cracks were found on the shield building that were not identified previously, and FirstEnergy Nuclear Operating Company ("FENOC"), owner and operator of Davis-Besse, is sampling and conducting further evaluations and testing to determine, for a third time, the root cause of the cracks and their apparent progression in the walls of the shield building.

Additionally, in February 2014, during hydro-demolition activities for creation of a construction opening in the shield building to support a scheduled steam generator replacement outage, FENOC learned that at least 26 sections of steel reinforcement (rebar) had been broken

and/or cracked in the 2011 (and 2014) construction opening area, each break or crack apparently located close to the mechanical splice coupling used to reconnect the rebar during the reactor head replacement outage in 2011.

Intervenors demonstrate below that a deep and concerning history of quality assurance (“QA”) failures at Davis-Besse have elevated QA to an aging management problem at the plant. They will also show that shield building cracking is continuing and that it is not reasonable to assume that cracks are strictly a current management problem, but are likely to increase and recur throughout the 20-year license renewal period. FENOC has previously been required to compile AMPs related to shield building cracking. Accordingly, Intervenors move for admission of Contention 6 in order to determine the adequacy of, and if need be, to challenge the sufficiency of, modifications to the Shield Building Monitoring Program and the Structures Monitoring Program Aging Management Plans (“AMPS”) credited for the shield building in the Davis-Besse License Renewal Application (“LRA”).

These recent events signify the latest evidence of serious and recurring departures from quality assurance standards at Davis-Besse even as proof of FENOC’s continuing misunderstanding of the source and causation of shield building cracking has emerged. The Atomic Safety and Licensing Board (“ASLB”) must finally accept the proposition that FENOC may be incapable of managing Davis-Besse safely and successfully through the proposed license extension period of 2017-2037. Intervenors seek to litigate the adequacy of FENOC’s anticipated modifications to Davis-Besse’s Shield Building Monitoring Program and the Structures Monitoring Program AMPs.

## I. BACKGROUND

### A. Recent New Information And Historical Context

On or about February 13, 2014, FENOC discovered an extensive air pocket or void of concrete in the Davis-Besse shield building's inner wall. The "Preliminary Notice of Event or Occurrence" ("PNO") which first appeared in the NRC's public-access ADAMS library on February 19, 2014 says this about the discovery:

On 02/14/2014, an unfilled area was discovered in the concrete along the top of the shield building construction opening on the annulus side. The condition was discovered during the current steam generator replacement outage, and is likely due to not completely repouring the shield building wall opening in 2011. Analysis shows this condition is bounded by previous calculations that demonstrate the containment function is maintained such that the protection of the health and safety of the public was not in question. Further analysis is planned to reconfirm previous calculations.

The NRC Resident Inspector has been notified.

PNO, Exhibit 1 hereto. According to an account in the Toledo Blade newspaper, after cutting a hole through the shield building to move the new steam generators in and take the old ones out, workers noticed a large void on the building's inner wall. The flaw runs the 25-foot length of a cut made through the building's wall in fall 2011, when a new reactor head was brought in and the old one was removed. "Davis-Besse Had Air Gap in Shield Building," February 15, 2014 (Exhibit 2). The void varies in width from six to 12 inches. The depth of it is something less than the 2.5-foot thickness of the concrete-and-steel structure; there is no evidence of the flaw on the structure's exterior. *Id.*

According to statements by an NRC staff member at an NRC-sponsored public comment session about the Davis-Besse Draft Supplement Environmental Impact Statement on March 25, 2014, the void was caused by FENOC workers or contractors having left forming devices in the concrete in 2011. The forms are used to shape the concrete pour inside the rebar skeleton of the

shield building when a temporary access opening is blasted through the shield building. In 2011, a perforation was made in the shield building for purposes of replacement of a corroded head on the reactor within the building. The NRC's David Hills told Victoria Clemons, a member of the public, that FirstEnergy "had decided to leave the forms on the inside wall because they knew they would have to cut through them again in 2 years." See Exhibit 3, Declaration of Victoria Clemons, ¶ 4. He further explained that "The rebar was damaged during the cutting of this opening [in 2014]" and, "The hydro saw damaged the rebar." Mr. Hills explained further, "The reason seems to be that there is a problem at the area of the splice of the rebar from the last [2011] cut." He explained that the rebar is crimped and clamped and that there appears to have been stress on the rebar splice, and that it is a problem "unseen" before. Id. ¶ 8.

Unfortunately, this is not the first time that concrete forms have been left in place within the shield building wall and have caused or masked voids in the pouring of concrete. It happened after a shield building through-wall cut in 2002 to replace the corroded reactor lid. In the October 18, 2002 "Minutes of Internal Meeting of Davis-Besse Oversight Panel" (Exhibit 4 attached), at p. 4/14 of .pdf, the oversight panel stated:

The containment vessel re-weld has been reviewed and accepted by the licensee and the ANI. . . . These items are being addressed after being called to the licensee's attention. The concrete pour to restore the shield building *revealed at least two surface voids when the forms were stripped. One void measured about 5" by 5" by 12" - information on the size of the other was not available.*

(Emphasis supplied).

And in the October 29, 2002 "Minutes of Internal Meeting of Davis-Besse Oversight Panel" (Exhibit 5 attached), at p. 4/13 of .pdf, this *ad hoc* committee noted that "*Surface voids occurred in the concrete pour to restore the shield building* which had not been resolved at the

conclusion of the inspection. Overall, there were no “findings” identified, but several observations were made” (Emphasis supplied).

The reactor shield building has not just a troubling history, but evidently faces a disquieting future, of multiple laminar and other concrete cracks. Intervenors in 2012 proffered six (6) filings totaling hundreds of pages following the observation of cracking in the shield building concrete in 2011 during the reactor head replacement project at Davis-Besse. They meticulously documented concerns that the proliferation of different types of cracks may have commenced in the 1970's before the plant had opened, and that their spreading and frequency of occurrence may be increasing with the passage of time. *See, generally*, “Intervenors’ Motion for Admission of Contention No. 5 on Shield Building Cracking,” and successive amendments and supplements: “Intervenors’ Motion to Amend ‘Motion for Admission of Contention No. 5’” (Feb. 27, 2012) ([hereinafter First Motion to Amend]; “Intervenors’ Motion to Amend and Supplement Proposed Contention No. 5 (Shield Building Cracking)” (June 4, 2012) (hereinafter Second Motion to Amend); “Intervenors’ Third Motion to Amend and/or Supplement Proposed Contention No. 5 (Shield Building Cracking)” (July 16, 2012) (hereinafter Third Motion to Amend); “Intervenors’ Motion to Amend and Supplement Proposed Contention No. 5 (Shield Building Cracking)” (July 23, 2012) (hereinafter Fourth Motion to Amend); “Intervenors’ Fifth Motion To Amend and/or Supplement Proposed Contention No. 5 (Shield Building Cracking)” (Aug. 16, 2012) (hereinafter Fifth Motion to Amend). Intervenors incorporate these filings and their accompanying exhibits fully herein as though rewritten.

The ASLB flatly rejected Intervenors’ Contention No. 5. “Memorandum and Order (Denying Motions to Admit, to Amend, and to Supplement Proposed Contention 5),”

LBP-12-27 (December 28, 2012). But in September 2013, additional concrete cracking which had not hitherto been identified was discovered in the shield building. On September 20, 2013, a Preliminary Notification of Event appeared in the NRC's ADAMS cache which stated as follows:

On August 26, 2013, the licensee was performing examinations of core bores in the shield building in accordance with the commitments First Energy Nuclear Operating Company (FENOC) made to the NRC. The commitment is for long term monitoring of the shield building which was documented in the NRC's Confirmatory Action Letter dated December 2, 2011 (ADAMS ML11336A355). The examinations performed in 2011 and 2012 showed no additional cracks. This year, using new instrumentation with enhanced capabilities, plant workers identified a *crack that had not been seen before. To date, the core bore examinations revealed seven previously unidentified cracks. FENOC has taken steps to reevaluate 43 core bores and will be looking at the remaining 39 going forward.*

(Emphasis supplied). PNO, Exhibit 6.

In a formal Request for Additional Information ("RAI") dated April 15, 2014 (ADAMS No. ML14097A454, Exhibit 7 hereto), the NRC Staff said that "during a subsequent routine baseline inspection in August/September 2013, FENOC discovered several (about 15) cracks on the Davis-Besse shield building that were not identified previously." The Staff continued:

Further, the NRC staff understands that in the ongoing February 2014 refueling outage, during hydro-demolition activities for creation of a construction opening in the Davis-Besse shield building to support the scheduled steam generator replacement, FENOC learned that several (at least 26) sections of steel reinforcement (rebar) had been broken and/or cracked in the construction opening area. Each section was apparently broken very close to the mechanical splice coupling used to splice the rebar during the head replacement outage in 2011.

Using enormous understatement, the NRC Staff thus admitted in the RAI that when the shield building was sealed shut following reactor head replacement in 2011, a stretch of the shield building wall which was 26-rebar-sections in length was not anchored to the rest of the rebar skeleton. The splices which joined the iron rebar rods together in the area of the shield building

where the skeletal structure of the building was patched shut were cracked or broken at the time the concrete was poured to complete the re-closure. After the 2011 resealing of the shield building, Davis-Besse operated at full power for over two years. While the information on the concrete voids is sparse and a bit unclear so far, it is legitimate to wonder if there is any relationship between the void, which apparently was located along the top of the 2011 construction opening, and the cracked and broken rebar, also located inside the perimeter of the 2011 construction opening.

According to the April 2014 RAI, FENOC has taken additional core samples of shield building concrete and is performing evaluations and testing to determine the root cause of the cracks and their apparent progression. An initial root cause analysis was performed in February 2012; a second report -- based on another round of assessments and analyses -- was completed in April 2012. The 2014 analysis, then, is the *third* root cause analysis.

One of the great historic QA and management failings at Davis-Besse (though by no means the only one) occurred in 2002 when a jagged corrosion hole the size of a loaf of bread was discovered in the reactor head. Of that discovery, NRC's Office of Inspector General reported that NRC itself -- not only FENOC -- had placed profits over safety, allowing the reactor pressure vessel lid to come within weeks, or even days, of rupturing due to deep corrosion. Had the lid breached, a "Loss-of-Coolant-Accident" or "LOCA" would have resulted, very possibly followed by a core meltdown, and potentially a catastrophic radioactivity release into the environment. The Government Accountability Office later called it "the most serious safety issue confronting the nation's commercial nuclear power industry since Three Mile Island." The Department of Justice said that FirstEnergy admitted it "knowingly had made false

representations to the Nuclear Regulatory Commission (NRC) in the course of attempting to persuade the NRC that its Davis-Besse Nuclear Power Station was safe to operate beyond December 31, 2001.” <http://kucinich.house.gov/News/DocumentSingle.aspx?DocumentID=272516>. In an editorial published on October 12, 2011 – just two days after Bechtel and Sargent & Lundy subcontractors discovered shield building cracking, but still before it had been revealed to the public and the media – the Toledo Blade ran an editorial entitled “Nuclear watchdog needed.” They wrote: “The 2002 reactor-head event cost FirstEnergy a record \$33.5 million in fines for lying to the government. The former head of the U.S. Department of Justice’s environmental crimes unit declared FirstEnergy showed ‘brazen arrogance’ and ‘breached the public trust.’” <http://www.toledoblade.com/Editorials/2011/10/12/Nuclear-watchdogneeded.html>.

## **B. Intervenors’ Prescient Prior Efforts To Raise The Issues of This Motion**

Intervenors alleged in 2012, when they filed Contention 5 over concerns about shield building cracking, that FENOC must describe how it will manage the cracking during the license renewal term. In support of their six (6) Contention 5 filings, Intervenors moved into evidence considerable documentation, such as the internal NRC calculations of two engineers who had determined that a minor earthquake or reactor thermal event could cause the collapse of very significant portions of the shield building walls, up to 90%. But it all came to naught; the contention was summarily rejected.

### *1. The ASLB’s Rejection of Contention 5 as ‘Speculation’*

In 2012, FENOC argued (noted by the ASLB at p. 20, fn 99 of LBP-12-27) that Intervenors’ claim that the shield building cracking must be addressed in the then-anticipated Draft

Supplemental Environmental Impact Statement (DSEIS) did not cure the alleged untimeliness of Intervenor’s Contention 5 motion. Review of the 2014 DSEIS since then shows zero mention of the shield cracking phenomena at all, not even as a subject for Severe Accident Mitigation Analysis (“SAMA”). Despite the NRC Staff’s DSEIS explanation that the “purpose of [SAMA analysis] is to ensure that plant changes (*i.e.*, hardware, procedures, and training) with the potential for improving severe accident safety performance are identified and evaluated” (DSEIS p. 5-3), there is no mention of the changes which have befallen the Davis-Besse shield building, although it is surely a “hardware” structure within the purview of SAMA evaluations.<sup>1</sup>

In 2012, the ASLB flayed the Intervenor’s for their “speculation” about the incipient and growing problem of cracking of the shield building:

. . . Contention 5 is based, in large part, on *pure speculation*. For example, Intervenor’s state that “there is a likelihood that the risks presented by the current cracks will only increase in the next few years.” Intervenor’s note that Davis-Besse will undergo a steam generator replacement in 2014, and argue that this fact supports their claim regarding increased risk. Intervenor’s provide no support for their argument that the 2014 steam generator replacement will increase the risk of cracking, and as such, their argument is *mere speculation*. In addition, Intervenor’s state that “it is conceivable that FENOC very well may need to replace its steam generators yet again after 2014 . . . risking further contributions to the cracking.” Whether FENOC will need to perform another steam generator replacement after 2014 is *mere speculation, on top of the mere speculation* that such a procedure might contribute to the cracking.

---

<sup>1</sup>The Davis-Besse reactor shield building constitutes a “system [or] structure . . . as delineated in [10 C.F.R.] §54.4. . . subject to an aging management review” because it “perform[s] an intended function . . . without moving parts . . . [and includes] the containment [and] containment liner. . .” 10 C.F.R. §54.21(a)(1). The shield building and the steel liner within it are among those “[p]lant systems, structures, and components” which are “[s]afety-related systems [and] structures . . . which are . . . relied upon to remain functional during and following design-basis events (as defined in 10 CFR 50.49 (b)(1)) to ensure the following functions - (i) The integrity of the reactor coolant pressure boundary; (ii) The capability to shut down the reactor and maintain it in a safe shutdown condition; or (iii) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those referred to in §50.34(a)(1), §50.67(b)(2), or §100.11 of this chapter, as applicable.” 10 C.F.R. §54.4(a)(1).

(Emphasis supplied). LBP-12-27 at pp. 34-35 (35-36 of .pdf). Intervenors maintain that they did not engage in mere speculation: they cited to the hydro-demolition firms, Bechtel and Sargent & Lundy's, own conceit that the cut-through process could have damaged the shield building.<sup>2</sup> And sometimes, even "mere speculation" has a way of coming home to roost. After Contention 5 was unceremoniously dismissed, FENOC unexpectedly acknowledged in September 2013, as stated in the introductory section of this Motion, that there is worsening shield building cracking. And the public now also knows of damage done to rebar in the breach area by hydro-demolition associated with the 2011 re-sealing of that building, and of the 2011 concrete void which may be related in some fashion to causing cracking or other shield building damage. Intervenors submit that it's time to stop accusing them of "mere speculation," and to examine, instead, the repression of public information by the NRC Staff and FENOC.<sup>3</sup> The problem is not so much Intervenors' "mere speculation" as it is the NRC Staff's and FENOC's "sheer denial."

## 2. Intervenors' 2012 Report of Substandard Rebar

In Intervenors' First Motion to Amend, filed in February 2012, they asserted that a January 31, 2012 NRC Inspection Report confirmed the interception of rebar intended by FENOC for installation in the 2011 access opening repair. ML12032A119 at p. 6<sup>4</sup> (10/93 of .pdf).

---

<sup>2</sup>Intervenors' FOIA response B/4, submitted with the motion. B/4 may be retrieved online at <http://www.beyondnuclear.org/relicensing/2012/8/11/nrc-foia-documents-regarding-davis-besse-shield-building-cra.html>

<sup>3</sup>Intervenors' pending 2014 FOIA request filed February 20, 2014 remains thwarted by an unprecedented dispute over Beyond Nuclear being charged for the records, and the public's understanding of the precise current status of the shield building is further confounded by the NRC Staff's opaque verbiage in the RAI of April 15, 2014.

<sup>4</sup>A finding of very low safety significance and an associated NCV of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings" were identified by the inspectors for the licensee's failure to control weld rod oven temperature in accordance with procedure WFMC-1 during a rebar

Although NRC Staff claimed to have prevented that flawed rebar installation from being made, the fact that there was substandard rebar associated with the 2011 wall patch inspires questions in 2014 about the 2011 cracked and broken rebar uncovered by the hydro-demolition for the 2014 access opening.

Notably, at p. 6 of their 2012 Third Motion to Amend (July 16, 2012), Intervenors chided the NRC Staff about its proposal to reduce, not increase, rebar inspection:

At the suggestion of the NRC Staff, the RRCA [Revised Root Cause Analysis] was revised at one point by deleting a statement from Section 3.3.9 - Failure Modes Analysis (pp. 50-51), which had stated that further investigation was needed regarding high-density reinforcing steel and small reinforcing steel spacing failure modes. Even FENOC had agreed that more investigation was needed; that statement was included in the February RCA.

Indisputably, the presence of high-density rebar, and small rebar spacing, causes cracking.

Implicit in this truism is that all the areas of the shield building surface and subsurface which have such rebar are vulnerable to cracking and should be extensively checked for status, which

---

splice weld completed for restoration of the shield building access opening. As a corrective action, the licensee removed the welder's certification to weld rebar and documented this issue in CR 2011-05536. To ensure that the horizontal rebar splice weld 2H-03R was not affected by delayed hydrogen cracking, the licensee's vendor examined the weld splice 48 hours after fabrication and did not identify cracks.

The finding was determined to be more than minor because the finding was associated with the Barrier Integrity Cornerstone attribute of Configuration Control and adversely affected the cornerstone objective to provide reasonable assurance that the physical design barriers (e.g., containment) protect the public from radionuclide releases caused by accidents or events. The shield building is part of the containment system. Absent NRC identification, rebar welds would have been fabricated with electrodes exposed to ambient temperatures for excessive periods of time creating a condition that results in hydrogen-induced weld cracking. Rebar splice material with cracks returned to service would increase risk for shield building failure during design basis events such as wind-driven missile impact or earthquake-induced loads. The inspectors completed a significance determination, in accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Phase 1 - Initial Screening and Characterization of Findings," Table 4a for the Containment Barrier. Because the issue was corrected promptly, prior to introduction of weld material with hydrogen-induced cracks, the inspectors answered "no" to each of the four Phase 1 screening questions. Therefore, the finding screened as having very low safety significance.

was neither planned as part of the AMP, and for which the justification has since been deleted.

3. *Intervenors Foretold Potential Significance In 2012  
Of Micro-Cracking and Radial Cracking*

In their July 16, 2012 Third Motion to Amend, Intervenors argued (p. 2) that “[t]he scope of the admitted cracking is far narrower than the identified cracking, and the potential for further concrete and rebar problems in the Davis-Besse shield building may include the loss of up to 90% of the shield building walls with the collapse of outer layers of concrete and rebar. . . .” In an extensive argument entitled “Micro-cracking Present in Core-Bore Samples” (*id.* pp. 3-5) which should have been taken seriously, FENOC’s laboratory contractor, CTL Group, had detected and reported shield building micro-cracking to FENOC. Intervenors argued (*id.* pp. 4-5):

There is indisputably a connection between micro-cracking and age-related degradation. FENOC’s consultant, Performance Improvement International, tacitly admitted such in its report, ‘Root Cause Assessment: Davis-Besse Shield Building Laminar Cracking, Vol. 1’ . . . . The AMP, however, contains literally no reference to micro-cracking. FENOC neither explains why the micro-cracking is present, nor why it is not significant, nor how it is not a sign of age-related degradation cracking.

In a section of the Third Motion to Amend entitled “Radial Cracking” (pp. 5-6), Intervenors cited NRC Staff criticism that FENOC had also ignored evidence of radial cracking in core bore samples. Intervenors urged that “In effect, FENOC admits to multiple forms of cracking from multiple root causes.” But FENOC ignored the findings and asserted that the cracking had not grown worse in 2011 and 2012.

However, since August/September 2013, FENOC has had to admit that the old cracking has grown worse, and new cracking has appeared. Nonetheless, FENOC continues to downplay the significance of the newly-identified micro-cracks of 2013. The NRC Staff’s RAIs seem to suggest, however, that the 2013 micro-cracking “discovery” has serious implications for the

2017-2037 Shield Building cracking AMP. FENOC remains fixated on sub-surface laminar cracking as the only cracking problem, and consequently has taken inadequate corrective actions based upon poorly-conceived aging management plans. Even in regards to the sub-surface laminar cracking it is so focused on, FENOC has not done adequate AMPs, nor even root cause analyses, extents of conditions, safety significance determinations, nor corrective actions.

#### 4. *Intervenors Sought AMP Modifications In 2012 Contention 5 Litigation*

Intervenors unsuccessfully sought far more aggressive investigation of the 2012 AMP for the shield building, including widespread deployment of impulse response tests, and other testing methods (which might have picked up the presence of the concrete void), hundreds more core samples than were promised by FENOC, and investigation across the full height and circumference of the structure. Only in 2013 did FENOC expand the technology with which it is investigating the cracking and in so doing, the additional cracking was detected. The original AMP for shield building cracking, FENOC Letter L-12-028 (April 5, 2012) (ADAMS ML12116A028) was confined to sensitivity analyses in areas of dense rebar spacing, and to development of plans as to the frequency and number of core bores, laboratory analyses and specification of areas of the shield building which would be investigated - in effect, a plan to have a plan. Intervenors objected particularly in their "Second Motion to Amend" (June 4, 2012). The Shield Building Monitoring Program, known as "B.2.43," consists of "inspections, testing or chemical analyses of the Shield Building concrete and reinforcing steel (rebar)," in which "[v]isual inspections will be performed on rebar (when exposed), core bore and core bore sample (concrete core) surfaces using plant-specific procedures implemented by inspectors qualified through plant-specific procedures." Chemical analyses, such as for carbonation and chloride degradation, were slated

by FENOC to be few and far between. The precise commitments to core bores, visual inspections, and chemical analyses are obscure; while AMPs are mentioned in the Appendix to the September 2013 SER, they are hidden from easy public access and not found in a single location.

It is, consequently, unclear whether or not the August/September 2013 revelations of new cracking initiation, and the growth of old cracking, has had any impact whatsoever on the number of sites on the shield building to be core bore tested, or the frequency with which these tests will be undertaken (annually, every other year, or once every five years).

As Intervenors pointed out at pp. 6-7 of their Third Motion to Amend (July 16, 2012) entitled “Laminar Cracking in Main Steam Line Room” (pages 6-7), “The NRC Staff pointed out (RRCA at 6) that ‘The root cause report has insufficient Impulse Response documentation to conclude that laminar cracking initiated in the shoulder regions and propagated to areas of high density reinforcement, specifically in the areas of the Main Steam Line Penetrations.’ ”

As mentioned above, Intervenors in 2012 called for more Impulse Response testing across the Shield Building, especially at strategic locations, such as those of high-density rebar, the Inner Face, and the access openings subjected to multiple rounds of piercing (which would have clearly revealed the gap). The status of the Inner Face rebar mat, as mentioned below, is of high significance to the structural integrity of the entire Shield Building wall, given the degradation of the Outer Face rebar mat functionality due to severe concrete cracking. As mentioned, the Inner Face rebar mat’s exposure to the elements for years on end calls its structural integrity into question.

5. Intervenors in 2012 and 2013 Predicted Structural Risks  
From Future Cut-Throughs of the Shield Building

At ¶ 20 of “Intervenors’ Motion for Admission of Contention No. 5 on Shield Building

Cracking” (January 10, 2012), Intervenors brought to the ASLB’s attention the high number of past and future maintenance-related perforations of the shield building:

Those patches are, of course, weak spots themselves, both the welded area on the inner steel containment, a mere 1.5 inches thick, as well as the “patched” area on the concrete shield building/secondary reactor containment structure, a mere 2.5 feet thick. As explained below, on January 4, 2012, David Lochbaum of UCS questioned whether the multiple holes cut in containment, and thus the multiple “patches” applied afterwards, overlapped, and how so. The “welds” on the inner steel container, and “repours” of concrete on the outer shield/secondary containment building, are themselves weak spots – perhaps repeatedly so in spots that have been involved in more than one cut-through and repair. This is a safety-significant issue that will grow all the more so with age-related degradation, and the prospect for yet one more cut-through and “repair” (patch) for the 2014 steam generator replacement project. In fact, FENOC has answered Lochbaum’s question about the overlap of the breaches. In its January 5, 2012 Camp Perry power point presentation cited previously, on Slide #18 (page 9 of the hardcopy handout), FENOC documents that indeed all of the first three breaches – 1970, 2002, and 2011 – have already overlapped, specifically in the top left-hand quadrant.

*Id.* pp. 21-22.

In 2013, Intervenors requested a hearing on proposed amendments to the Davis-Besse license as a precursor to swapping out the plant’s two aged steam generators. *FirstEnergy Nuclear Operating Company* (Davis-Besse Nuclear Power Station, Unit 1), 50-346-LA. In that litigation, Intervenors filed the “Expert Witness Report of Arnold Gundersen,” a declaration by an experienced nuclear power engineer who critiqued the plan (Exhibit 8 hereto). At pp. 6-7 of Gundersen’s report, he commented that with four (4) historical breaches of the shield building, Davis-Besse will surpass the entire domestic nuclear plant industry:

Conveniently, the list of experimental changes identified by FENOC does not include additional modifications applied by FENOC to cut into the Davis-Besse containment for the fourth time since it was constructed. To the best of Fairewinds’ knowledge and belief, no other containment structure has been cut open more than twice, yet Davis-Besse’s fourth containment perforation should have been identified by the 10 C.F.R. §50.59 process as problematic and therefore requiring a license amendment review and application.

## 6. Unexplored Inner Rebar Mat

Another deficiency in existing AMP arrangements is that they wholly neglect the shield building's inner face exposure to the elements. For several years in the 1970s, before the dome was put in place, and before the initial construction opening was closed, the inner face rebar mat and concrete were exposed to all seasons of weathering. This neglected facet of shield building history calls into question the structural integrity of the inner face rebar mat, as well. As a part of Intervenors' years-long call for more frequent testing, in more locations, using diverse testing methodologies, they have demanded comprehensive testing of the shield building's interior, its inner face.

### **II. The Shield Structure Is A Physical Asset Requiring Aging-Management; Review Of The Concrete Pouring/Void Problem, Recurring Cracking And Rebar Damage Must Be Addressed As Part Of GALL In Rendering The License Extension Determination**

The Davis-Besse reactor shield building constitutes a “system [or] structure . . . as delineated in [10 C.F.R.] §54.4. . . subject to an aging management review” because it “perform[s] an intended function . . . without moving parts . . . [and includes] the containment [and] containment liner. . . .” 10 C.F.R. §54.21(a)(1). The shield building and the steel liner within it are among those “[p]lant systems, structures, and components” which are “[s]afety-related systems [and] structures . . . which are . . . relied upon to remain functional during and following design-basis events (as defined in 10 CFR 50.49 (b)(1)) to ensure the following functions - (i) The integrity of the reactor coolant pressure boundary; (ii) The capability to shut down the reactor and maintain it in a safe shutdown condition; or (iii) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those referred to in §50.34(a)(1), §50.67(b) (2), or §100.11 of this chapter, as

applicable.” 10 C.F.R. §54.4(a)(1).

The aging of materials is important during the period of extended operation, since certain components may have been designed considering an assumed service life of forty years. *Florida Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 & 4), CLI-01-17, 54 NRC 3, 7 (2001); *Entergy Nuclear Generation Co. And Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), LBP-06-24, 64 NRC 257, 276 (2006). Part 54 requires license renewal applicants to demonstrate how they will manage the effects of aging during the period of extended operation. *Florida Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 & 4), CLI-01-17, 54 NRC 3, 8 (2001). Applicants must demonstrate how their programs will manage the effects of aging in a detailed manner with respect to specific components and structures, rather than at a more generalized system level. *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc., supra* at 64 NRC 275.

Sections 54.21 and 54.29 require that license renewal applications demonstrate by a preponderance of the evidence that aging management programs provide reasonable assurance that SSCs will continue to perform their intended functions consistent with the current licensing basis during the period of extended operation. Whether the reasonable assurance is met will be determined on a case-by-case basis using sound technical judgment. Reasonable assurance “is not susceptible to formalistic quantification (*i.e.*, 95% confidence) or mechanistic application.” *AmerGen Energy Co., LLC* (Oyster Creek Nuclear Generating Station), LBP-07-17, 66 NRC 327, 340 (2007), *aff’d* CLI-09-07, 69 NRC 235 (2009).

### **III. Implications Of FENOC’s Repeated Management Failings Must Be Analyzed Within the Supplemental Environmental Impact Statement**

The National Environmental Policy Act (NEPA) requires disclosure of environmental

impact assumptions and the basis for agency decisions in license renewal requests. In an attempt to fulfill its NEPA obligations, the NRC has recently published a Draft Supplemental Environmental Impact Statement (hereafter DSEIS) based in part on FENOC's Environmental Report, which does not identify incremental QA failings related to the shield building, nor expanded cracking, recurring concrete voids, and substandard and/or damaged rebar as a problem. Identifying such negative events should implicate Severe Accident Mitigation Alternatives (SAMA) consideration within the DSEIS.

Under NEPA, agencies are to adequately identify and study the environmental issues which are engendered by the undertaking. *Crouse Corp. v. Interstate Commerce Comm'n*, 781 F.2d 1176 (6th Cir. 1986). The harm is complete when an agency makes a decision without sufficiently considering information NEPA requires be placed before the decision-maker and public. *Sierra Club v. Marsh*, 872 F.2d 497, 500 (1st Cir. 1989). The injury of an increased risk of harm due to an agency's uninformed decision is precisely the type of injury [NEPA] was designed to prevent." *Comm. to Save the Rio Hondo v. Lucero*, 102 F.3d 445, 448-49 (10th Cir. 1996).

The scope of the environmental review is defined by 10 C.F.R. Part 51, the NRC's "Generic Environmental Impact Statement [GEIS] for License Renewal of Nuclear Plants" (NUREG 1437 (May 1996)), and the initial hearing notice and order. *See, e.g., Vermont Yankee*, 2006 NRC Lexis 201 (ASLB 9/22/2006). The GEIS may, *prima facie*, place some environmental issues that might otherwise be germane in a license renewal proceeding "beyond the scope of a license renewal hearing." *Matter of Florida Power & Light Co. (Turkey Point Nuclear Power Plant)*, CLI-01-17, 54 NRC 3, 15 (7/19/2001). These "Category 1" issues, which are classified in

10 C.F.R. Part 51, Subpart A, Appendix B, may nonetheless be raised when a petitioner demonstrates that “there is new and significant information subsequent to the preparation of the GEIS regarding the environmental impacts of license renewal.” *See Turkey Point*, 54 NRC at 10-12; *see also* 10 C.F.R. § 51.53(c)(3)(iv) (new and significant information).

NEPA imposes continuing obligations on the NRC following completion of an environmental analysis. An agency that receives new and significant information casting doubt upon a previous environmental analysis must reevaluate the prior analysis. *Marsh v. Oregon Natural Resources Council*, 490 U.S. 360, 374 (1989). This requirement is codified in NRC regulations at 10 C.F.R. §51.92(a). The NRC’s license renewal application regulations also contain this obligation. 10 C.F.R. §51.53(c)(3)(iv) (ER must contain “any new and significant information regarding the environmental impacts of license renewal of which the applicant is aware”). The Commission has concluded that this applicant obligation extends to new and significant information even when such information pertains to a Category 1 issue. *See Duke Energy Corp.* (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Units 1 and 2), CLI-02-14, 55 NRC 278, 290 (2002). In *Vermont Yankee*, 50-271-LR (9/22/2006) at 17-27, the Commission recognized:

. . . that even generic findings sometimes need revisiting in particular contexts. Our rules thus provide a number of opportunities for individuals to alert the Commission to new and significant information that might render a generic finding invalid, either with respect to all nuclear power plants or for one plant in particular. In the hearing process, for example, petitioners with new information showing that a generic rule would not serve its purpose at a particular plant may seek a waiver of the rule. See 10 C.F.R. § 2.758; *see also* note 3, *supra*, and accompanying text. Petitioners with evidence that a generic finding is incorrect for all plants may petition the Commission to initiate a fresh rulemaking. See 10 C.F.R. §2.802. Such petitioners may also use the Supplemental Environmental Impact Study (SEIS) notice-and-comment process to ask the NRC to forgo use of the suspect generic finding and to suspend license renewal proceedings, pending a rulemaking or updating of the GEIS. See 61 Fed. Reg. at 28,470; GEIS at 1-10

to 1-11.

With respect to the issues in Appendix B, Category 2 issues, (1) the applicant must make a plant-specific analysis of environmental impacts in its Environmental Report, 10 C.F.R. §51.53( c)(3)(ii), and (2) NRC Staff must prepare a Supplemental Environmental Impact Statement (SEIS), id. §51.95(c). Contentions implicating Category 2 issues ordinarily are deemed to be within the scope of license renewal proceedings. *See Turkey Point*, 54 NRC at 11-13; *Matter of Amergen Energy Co. (Oyster Creek)*, 50-0219-LP, 2006 NRC Lexis 195 (Feb. 27, 2006).

Despite the “small” significance assigned to Category 1 “Postulated Accidents” at 10 C.F.R. Part 51, Subpart A, Appendix B, Intervenors contend that the poor quality assurance management of the structural integrity of the shield building, from concrete voids, to defective rebar, to a continuing misunderstanding of the scope and extent of the unique cracking phenomenon, should negate the generic finding in this license renewal case. Lousy QA at Davis-Besse has, itself, become an aging management problem. The potential for a severe accident might be implicated were the recurring concrete voids, or use of below-grade and/or damaged rebar allowed to be repeated in the closure of the shield building during this current steam generator swapout and any future, as-yet unanticipated, needs to perforate the shield building. A severe accident might follow upon expanded cracking and a minor earthquake or thermal/pressure event within the shield building. The analysis in the GEIS for Category 2 “Severe Accidents” requires a showing “that one or more of the criteria of Category 1 cannot be met, and therefore additional plant-specific review is required.” This review must include the taking into account of the possible effects that the 2011 concrete honeycombing may have had upon initiating or worsening

cracking in the structure.

NEPA obligates the NRC to make reasonable forecasts of the future. *Northern States Power Co.* (Prairie Island Nuclear Generating Plant, Units 1 & 2), ALAB-455, 7 NRC 41, 48, 49 (1978); *Hydro Res., Inc.*, LBP-04-23, 60 NRC 441, 447 (2004), *review declined*, CLI-04-39, 60 NRC 657 (2004). It is no longer reasonable to expect competent QA oversight from FENOC, and the 2011 concrete pour event suggests, further, that the NRC Staff cannot escape scrutiny for grossly inadequate regulatory supervision.

#### **IV. Contention Admissibility Standards**

##### 10 C.F.R. §2.309(f)(2) factors

The presiding ALSB in this case stated at p. 12 of the Initial Scheduling Order, ASLBP No. 11-907-01-LR-BD01 (June 15, 2011) that “The Board directs that a motion and proposed new contention shall be deemed timely under 10 C.F.R. § 2.309(f)(2)(iii) if it is filed within sixty (60) days of the date when the material information on which it is based first becomes available to the moving party through service, publication, or any other means. If filed thereafter, the motion and proposed contention shall be deemed nontimely under 10 C.F.R. §2.309(c). If the movant is uncertain, it may file pursuant to both sections.”

The requirements for determining the timeliness of a new Contention 6 are set forth in 10 C.F.R. §2.309(f)(2), but 10 C.F.R. §2.309(c) is also potentially relevant, given that it provides criteria for boards to apply in deciding whether to admit “nontimely filings.” Section 2.309(f)(2) allows a new contention to be filed, following the initial docketing of a case, with leave of the presiding officer upon a showing that (i) The information upon which the amended or new contention is based was not previously available; (ii) The information upon which the amended

or new contention is based is materially different than information previously available; and (iii) The amended or new contention has been submitted in a timely fashion based on the availability of the subsequent information.

The NRC's announcement of the discovery of a new concrete void with the 2014 hydro-demolition was posted at its website on February 19, 2014. It materially differs from the previously-available information as to the 2011 resealing of the shield building, because the assumption was that the integrity of the structure (such as it was) was not compromised.

Intervenors first learned of the discovery of shield building rebar failure on March 25, 2014, from Victoria Clemons, whose Declaration accompanies this filing. They learned further details from the April 15, 2014 Request for Additional Information sent by the NRC Staff to FENOC. That correspondence was also the first time that Intervenors learned that the Staff was requesting FENOC to incorporate modifications into Davis-Besse's Shield Building Monitoring Program and the Structures Monitoring Program Aging Management Plans from the August/September 2013 discovery of expanded shield building cracking and the February 2014 discovery of broken and cracked rebar. Hence this Motion is timely brought.

*Discussion of 10 C.F.R. §2.309( c) factors*

If a contention based on new information fails to satisfy the three-part test of §2.309(f)(2)(i)–(iii), it may be evaluated under §2.309(c). Section 2.309(c)(1) includes eight factors that boards must balance in evaluating nontimely intervention petitions, hearing requests, and contentions. The factors are: (i) Good cause, if any, for the failure to file on time; (ii) The nature of the [petitioner's] right under the Act to be made a party to the proceeding; (iii) The nature and extent of petitioner's property, financial or other interest in the proceeding; (iv) The

possible effect of any order that may be entered in the proceeding on the [petitioner's] interest; (v) The availability of other means whereby the [petitioner's] interest will be protected; (vi) The extent to which the [petitioner's] interests will be represented by existing parties; (vii) The extent to which the [petitioner's] participation will broaden the issues or delay the proceeding; and (viii) The extent to which the [petitioner's] participation may reasonably be expected to assist in developing a sound record.

While Intervenors assert that they have filed on time, if the ASLB for some reason does not agree, then alternatively they state that they have "good cause" for late filing per §2.309( c) (1)(i). Their contention alleges serial failure of reconstruction of the shield building in a manner which would allow the structure to perform its intended purposes, a continuing and uncapped shield building concrete cracking phenomenon, an unsolved rebar breakage and cracking problem, insufficient NEPA disclosure and the associated and repeated failures of QA which have either failed to find and avert these problems, or which have fostered them (i). Intervenors have a right to raise the contention, because they are already parties to this continuing license renewal proceeding (ii).<sup>5</sup> Intervenors' interest in the proceeding has been adjudicated and recognized by the ASLB previously in this case (iii). The possible effect of an order approving the Final SEIS without a much more serious and stringent SAMA which reflects the valid assumption of competent QA management of the shield building, will affect Intervenors' procedural rights under NEPA. The failure of the shield building could compromise public health and safety absent demonstration within the SER that there are Generic Aging Lessons Learned

---

<sup>5</sup>Intervenors were accorded representational standing by the Atomic Safety and Licensing Board in a Memorandum and Order issued earlier in this case. *FirstEnergy Nuclear Operating Company* (Davis-Besse Nuclear Power Station, Unit 1) LBP-11-13 at 30 (slip op.).

(GALL) from the recidivistic failure to reconstruct the shield building properly, and from the cracking, all of which must be addressed in pertinent AMPs (iv). Intervenors have no recourse to have aging-related problems at Davis-Besse mandatorily addressed outside of the pending LRA proceeding, in which they can also obtain a more comprehensive SAMA analysis, get a genuine, meaningfully recast QA program via revisions to the Davis-Besse SER, and see that the most comprehensive and sophisticated monitoring possible of the shield building cracking is installed. No alternative means of attainment of these goals exist (v). The other parties to this proceeding - FENOC and the NRC Staff - are both malefactors in the concrete void discovery - surely a major QA failing; in the formulation and implementation of the previous, inadequate AMPs; and in thorough preparation of NEPA documents (ER and DSEIS); consequently, there is no other party in the proceeding besides Intervenors who can represent Intervenors' interests (vi).

While the issues of this proceeding will be broadened by admission of Contention 6, “[t]o the extent there will be any delay, it is the price for affording the public the opportunity to litigate questions arising from an applicant’s failure to comply with QA requirements;”<sup>6</sup> this proceeding remains open and pending because of the ongoing revisions to the Commission’s “waste confidence” determination and the NRC’s regulatory activity on the latest concrete void may remain an open item for some time (vii). Finally, Intervenors’ advancement of Contention 6 may reasonably be expected to assist in developing a sound record, because in the litigation of other contentions, Intervenors have capably presented evidence and argument of very complicated issues; finally the issue posed by Contention 6 raise important questions with direct implications for the safe operation of Davis-Besse during the conjectured 20-year extension period (viii).

---

<sup>6</sup>*Detroit Edison Company* (Fermi Nuclear Power Plant, Unit 3), LBP-10-09 at 14.

In *Crow Butte Res., Inc.* (North Trend Expansion Area), CLI-09-12, 69 NRC 535, 549 (2009), the Commission upheld the Licensing Board's finding that the petitioner demonstrated "good cause" for its late filing and affirmed that "[g]ood cause' is the most significant of the late-filing factors set out at 10 C.F.R. § 2.309( c).” *Id.* at 549 n.61. If good cause is not shown, the board may still permit the late filing, but the petitioner must make a strong showing on the other factors. *See Pac. Gas and Elec. Co.* (Diablo Canyon Power Plant Independent Spent Fuel Storage Installation), CLI-08-1, 67 NRC 1, 5–8 (2008). Intervenors maintain that they have demonstrated ample “good cause” for Contention 6 to be admitted to this case, but if the Board disagrees, there still is a strong showing on the other §2.309( c) factors.

10 C.F.R. §2.309(f)(1) factors

Finally, the ordinary contention admissibility criteria of §2.309(f)(1) are satisfied here. An admissible contention under 10 C.F.R. §2.309(f)(1)(i)-(vi) must: (i) provide a specific statement of the issue of law or fact to be raised; (ii) provide a brief explanation of the basis for the contention; (iii) demonstrate that the issue raised is within the proceeding’s scope; (iv) demonstrate that the issue raised is material to the findings the NRC must make to support the action that is involved in the proceeding; (v) provide a concise statement of the alleged facts or expert opinions, including references to specific sources and documents, that support the petitioner’s position and upon which the petitioner intends to rely at hearing; and (vi) show that a genuine dispute exists on a material issue.

**§2.309(f)(1)(i) Statement of the Contention**

The improper concrete pour in 2011, discovered in the form of a 25' long void, or air space in the reconstructed area of the Davis-Besse shield building where a 2011 maintenance

access had been hydrologically cut is at least the second known concrete void at the plant. This “honeycombing” problem is complicated by the contemporaneous February 2014 discovery of broken and damaged rebar in the vicinity of the void. These shield building reconstruction problems coincide with the identification of continued and expanding concrete laminar and other cracking within the walls of the plant’s shield building, which was verified by a FENOC investigation during August/September 2013. These problems represent ongoing aging problems compounded and intertwined with management failures; they are unmentioned and undocumented within the DSEIS for Davis-Besse; they may be interrelated or synergistic; they each are precedented at Davis-Besse; and they must be more intensely subjected to Aging Management Plans (AMPs) than has heretofore happened. The Draft and Final SEIS documents must be reconfigured in recognition of the lax management and QA failings, and the failings of the physical components of the shield building so that the true nature of these historic problems can be revealed and analyzed in the NEPA documents and in the severe accident mitigation alternatives analysis (SAMA). Relevant AMPs must be redrawn to anticipate and account for the implications or insufficient and irregular aging management of the shield building. Also, the Safety Evaluation review and overall SE Report must be rewritten to articulate modified AMPs and QA procedures which will reasonably assure that the plant can operate safely between now and April 22, 2017, and during the extended operating license period from 2017 until 2037.

#### **§2.309((f)(1)(ii) Brief Explanation of the Contention Basis**

The shield building is a critical physical asset which ensures safe, unimpeded functioning of the Davis-Besse nuclear reactor. It is subject to aging management review. The recurring concrete void problem, cracking problem and rebar problem have or may compromise important

structures and safety features at the plant and have not been properly disclosed to the public under NEPA. The cracking problem has proven not to be susceptible of management under AMP commitments in place since 2012. FENOC has a history of major QA management disappointments, such as the 2002 corrosion hole in the reactor lid. There is no evidence in the Safety Evaluation Report (SER) nor the Severe Accident Mitigation Analysis within the DSEIS which document the serial QA and management failings at Davis-Besse and the continuing and unresolved cracking of the shield building or which account for them in a conscious effort to enhance the margins of safety at the plant and reduce the potential for accidents. There is no Generic Aging Lessons Learned discussion of the concrete void recurrence in the SER, nor in the DSEIS. The NRC Staff has called upon FENOC to modify its aging management plans for the shield building.

**§2.309(f)(1)(iii) Explanation of How Contention Falls Within Scope of Proceeding**

The physical deterioration and related poor management oversight of the shield building by FENOC fall well within the scope of this license renewal case. This issue “focuses on ‘the potential impacts of an additional 20 years of nuclear power plant operation,’ not on everyday operational issues.” *Dominion Nuclear Connecticut, Inc.* (Millstone Nuclear Power Station, Units 2 & 3), CLI-06-4, 63 NRC 32, 37 (2006) (quoting *Dominion Nuclear Connecticut, Inc.* (Millstone Nuclear Power Station, Units 2 & 3), CLI-04-36, 60 NRC 631, 637-38 (2004)); see also *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), LBP-08-22, 68 NRC 590, 598-600 (2008).

The scope of a safety review for license renewal is limited to (1) managing the effects of aging of certain systems, structures, and components; (2) review of time-limited aging evalua-

tions; and (3) any matters for which the Commission itself has waived the application of these rules. *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), LBP-08-22, 68 NRC 590, 598-600 (2008); *Florida Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 & 4), LBP-01-6, 53 NRC 138, 152 (2001). *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), LBP-06-24, 64 NRC 257, 276, 277 (2006). The NRC Staff has required AMP arrangements for the Davis-Besse shield building since 2012, and is now requesting modifications to conform to apparent further deterioration and mismanagement of reconstruction after maintenance openings in its walls and worsened cracking as revealed in August/September 2013.

Three general categories of SSCs “fall within the ‘initial focus’” of license renewal review as outlined in 10 C.F.R. § 54.4. *Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), CLI-10-14, 71 NRC \_\_ (June 17, 2010) (slip op. at 7). Section 54.21 provides standards for license renewal applicants to determine which of the components within the three general categories defined in § 54.4 require aging management review. *Id.* Only those SSCs that perform “an intended function” as defined by § 54.4 require aging management review. *Id.* With respect to each structure, system, or component requiring aging management review, “a license renewal applicant must demonstrate that the ‘effects of aging will be adequately managed so that the *intended function(s)* [as defined in § 54.4] will be maintained consistent with the CLB for the period of extended operation.” *Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), CLI-10-14, 71 NRC \_\_ (June 17, 2010) (slip op. at 8) (quoting 10 C.F.R. 54.21(a)(3)) (emphasis in original). While some SSCs perform more than one function, the license renewal application is only required to

provide reasonable assurance that SSCs “will perform such that the *intended functions*, as delineated in §54.4, are maintained consistent with the CLB.” *Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), CLI-10-14, 71 NRC \_\_ (June 17, 2010) (slip op. at 17) (quoting License Renewal Rule, 60 Fed. Reg. 22,461, 22,479 (May 8, 1995)) (emphasis in original).

**§2.309((f)(1)(iv) How the Issues Raised Are Material to the Findings the NRC Must Make**

The concrete void, flawed rebar and cracking problems at Davis-Besse have occurred before. FENOC has previously assembled AMPs related to management of the cracking issue. There was a concrete void construction error in 2002. Taken with other major QA failings during FENOC’s aegis, QA management has become a feature which requires aging management. The expanding multiplicity of shield building cracks and the potential for damaged rebar throughout the structure also necessitate AMP commitments. Until there are thorough understandings between FENOC and the NRC Staff of the sources and causations of the shield building cracks coupled with a realistic commitment to handle the likelihood of continued deterioration of the structure, it will prompt safety concerns.

The ASLB also must approve a competently-written SAMA analysis under NEPA. A complete, forthcoming Supplemental Environmental Impact Statement is legally pertinent and material to the license renewal findings sought by FENOC in this proceeding.

**§2.309((f)(1)(v) Concise Statement of Alleged Facts Supporting Motion**

On February 14, 2014, FirstEnergy notified the Nuclear Regulatory Commission that the utility had discovered an extensive air pocket or gap of concrete in the Davis-Besse shield building's inner wall on February 13.

The “Preliminary Notice of Event or Occurrence” (“PNO”) which first appeared in the NRC’s public-access ADAMS library on February 19, 2014 says this about the discovery:

On 02/14/2014, an unfilled area was discovered in the concrete along the top of the shield building construction opening on the annulus side. The condition was discovered during the current steam generator replacement outage, and is likely due to not completely repouring the shield building wall opening in 2011. Analysis shows this condition is bounded by previous calculations that demonstrate the containment function is maintained such that the protection of the health and safety of the public was not in question. Further analysis is planned to reconfirm previous calculations.

The NRC Resident Inspector has been notified.

PNO, Exhibit 1 hereto. According to an account in the Toledo Blade newspaper, after cutting a hole through the shield building to move the new steam generators in and take the old ones out, workers noticed a large void on the building’s inner wall. The flaw runs the 25-foot length of a cut made through the building’s wall in fall 2011, when a new reactor head was brought in and the old one was removed. “Davis-Besse Had Air Gap in Shield Building,” February 15, 2014 (Exhibit 2). The void varies in width from six to 12 inches. The depth of it is something less than the 2.5-foot thickness of the concrete-and-steel structure; there is no evidence of the flaw on the structure’s exterior. *Id.*

According to statements by an NRC staff member at an NRC-sponsored public comment session about the Davis-Besse Draft Supplement Environmental Impact Statement on March 25, 2014, the void was caused by FENOC workers or contractors having left forming devices in the concrete in 2011. The forms are used to shape the concrete pour inside the rebar skeleton of the shield building when a temporary access opening is blasted through the shield building. In 2011, a perforation was made in the shield building for purposes of replacement of a corroded head on the reactor within the building. The NRC’s David Hills told Victoria Clemons, a member of the public, that FirstEnergy “had decided to leave the forms on the inside wall because they knew

they would have to cut through them again in 2 years.” See Exhibit 3, Declaration of Victoria Clemons, ¶ 4. He further explained that “The rebar was damaged during the cutting of this opening [2014]” and, “The hydro saw damaged the rebar.” Mr. Hills explained further, “The reason seems to be that there is a problem at the area of the splice of the rebar from the last [2011] cut.” He explained that the rebar is crimped and clamped and that there appears to have been stress on the rebar splice, and that it is a problem “unseen” before. *Id.* ¶ 8.

Unfortunately, this is not the first time that concrete forms have been left in place within the shield building wall and have caused voids in the pouring of concrete. It happened after a shield building through-wall cut in 2002 to replace the terribly-corroded reactor lid. In the October 18, 2002 “Minutes of Internal Meeting of Davis-Besse Oversight Panel” (Exhibit 4 attached), at p. 4/14 of .pdf, the oversight panel stated:

The containment vessel re-weld has been reviewed and accepted by the licensee and the ANI. . . .

These items are being addressed after being called to the licensee’s attention. The concrete pour to restore the shield building revealed *at least two surface voids when the forms were stripped. One void measured about 5" by 5" by 12"* - information on the size of the other was not available.

(Emphasis supplied).

And in the October 29, 2002 “Minutes of Internal Meeting of Davis-Besse Oversight Panel” (Exhibit 5 attached), at p. 4/13 of .pdf, this *ad hoc* committee noted:

*Surface voids occurred in the concrete pour* to restore the shield building which had not been resolved at the conclusion of the inspection. Overall, there were no “findings” identified, but several observations were made.

(Emphasis supplied).

The reactor shield building has not just a troubling history, but evidently a disquieting future, of multiple laminar and other concrete cracks. Intervenors in 2012 proffered multiple

filings following the observation of cracking in the shield building concrete in 2011 during the reactor head replacement project at Davis-Besse. They meticulously documented concerns that the proliferation of different types of cracks may have commenced in the 1970's before the plant had opened, and that their spreading and frequency of occurrence may be increasing with the passage of time. *See, generally*, “Intervenors’ Motion for Admission of Contention No. 5 on Shield Building Cracking,” and successive amendments and supplements: “Intervenors’ Motion to Amend ‘Motion for Admission of Contention No. 5’” (Feb. 27, 2012) ([hereinafter First Motion to Amend); “Intervenors’ Motion to Amend and Supplement Proposed Contention No. 5 (Shield Building Cracking)” (June 4, 2012) (hereinafter Second Motion to Amend); “Intervenors’ Third Motion to Amend and/or Supplement Proposed Contention No. 5 (Shield Building Cracking)” (July 16, 2012) (hereinafter Third Motion to Amend); “Intervenors’ Motion to Amend and Supplement Proposed Contention No. 5 (Shield Building Cracking)” (July 23, 2012) (hereinafter Fourth Motion to Amend); “Intervenors’ Fifth Motion To Amend and/or Supplement Proposed Contention No. 5 (Shield Building Cracking)” (Aug. 16, 2012) (hereinafter Fifth Motion to Amend). Intervenors incorporate these filings and their accompanying exhibits fully herein as though rewritten.

The ASLB flatly rejected Intervenors’ Contention No. 5. Memorandum and Order (Denying Motions to Admit, to Amend, and to Supplement Proposed Contention 5), LBP-12-27.

But in September 2013, additional concrete cracking which had not hitherto been identified was discovered in the shield building. On September 20, 2013, a Preliminary Notification of Event appeared in the NRC’s ADAMS cache which stated as follows:

On August 26, 2013, the licensee was performing examinations of core bores in the shield building in accordance with the commitments First Energy Nuclear Operating

Company (FENOC) made to the NRC. The commitment is for long term monitoring of the shield building which was documented in the NRC's Confirmatory Action Letter dated December 2, 2011 (ADAMS ML11336A355). The examinations performed in 2011 and 2012 showed no additional cracks. *This year, using new instrumentation with enhanced capabilities, plant workers identified a crack that had not been seen before. To date, the core bore examinations revealed seven previously unidentified cracks.* FENOC has taken steps to reevaluate 43 core bores and will be looking at the remaining 39 going forward.

(Emphasis supplied). PNO, Exhibit 6.

In a formal Request for Additional Information ("RAI") dated April 15, 2014 (ADAMS No. ML14097A454), the NRC Staff said that "during a subsequent routine baseline inspection in August/September 2013, FENOC discovered several (about 15) cracks on the Davis-Besse shield building that were not identified previously." The Staff continued:

Further, the NRC staff understands that in the ongoing February 2014 refueling outage, during hydro-demolition activities for creation of a construction opening in the Davis-Besse shield building to support the scheduled steam generator replacement, FENOC learned that several (at least 26) sections of steel reinforcement (rebar) had been broken and/or cracked in the construction opening area. Each section was apparently broken very close to the mechanical splice coupling used to splice the rebar during the head replacement outage in 2011.

Using characteristic understatement, the NRC Staff thus establishes that when the shield building was sealed shut following reactor head replacement in 2011, a stretch of the shield building wall which was 26-rebar-sections in length was not anchored. The splices which joined the iron rebar rods together in the area of the shield building where the skeletal structure of the building was reconstructed were cracked or broken at the time the concrete was poured to complete the re-closure. After the 2011 resealing of the shield building, Davis-Besse operated at full power for over two years. While the information on the concrete voids is sparse and a bit unclear, it is legitimate to wonder if there is any relationship between the concrete void found along the top of the 2011 construction opening, and the cracked and broken rebar, also located within the

perimeter of the 2011 construction opening.

According to the April 15, 2014 RAI, FENOC has taken additional core samples of concrete and is performing evaluations and testing to determine the root cause of the cracks and their apparent progression. A root cause analysis was performed in February 2012; a second, revised analysis was completed in April 2012. The 2014 analysis is the third.

One of the great historic QA failings at Davis-Besse (though by no means the only one) occurred in 2002 when a jagged corrosion hole the size of a loaf of bread was discovered in the reactor head. Of that discovery, NRC's Office of Inspector General reported that NRC itself – not only FENOC – had placed profits over safety, allowing the reactor pressure vessel lid to come within weeks, or even days, of rupturing due to deep corrosion. Had the lid breached, a “Loss-of-Coolant-Accident” or “LOCA” would have resulted, very possibly followed by a core melt-down, and potentially a catastrophic radioactivity release into the environment. The Government Accountability Office later called it “the most serious safety issue confronting the nation's commercial nuclear power industry since Three Mile Island.” The Department of Justice said that FirstEnergy admitted having “knowingly made false representations to the Nuclear Regulatory Commission (NRC) in the course of attempting to persuade the NRC that its Davis-Besse Nuclear Power Station was safe to operate beyond December 31, 2001.” <http://kucinich.house.gov/News/DocumentSingle.aspx?DocumentID=272516>. In an editorial published on October 12, 2011 – just two days after Bechtel and Sargent & Lundy subcontractors discovered shield building cracking, but still before it had been revealed to the public and the media – the *Toledo Blade* ran an editorial entitled “Nuclear watchdog needed.” They wrote: “The 2002 reactor-head event cost FirstEnergy a record \$33.5 million in fines for lying to the government. The former

head of the U.S. Department of Justice's environmental crimes unit declared FirstEnergy showed 'brazen arrogance' and 'breached the public trust.'" <http://www.toledoblade.com/Editorials/2011/10/12/Nuclear-watchdogneeded.html>.

## **CONCLUSION**

The generic aging lesson learned (GALL) by the public respecting the shield building and management of its reconstruction when patching must be performed is that FENOC appears incapable of learning lessons. Considerable public interest was aroused in 2011 when shield building cracking was found. Although the controversial February 2012 root cause analysis was still months away from completion in Fall 2011, FENOC proceeded to order the hasty resealing of the shield building in November. At ¶ 23 of Intervenors' Motion for Admission of Contention No. 5 on Shield Building Cracking, at p.24, Intervenors stated:

Of additional concern is that the pour of new concrete to re-seal the shield building foreclosed significant investigatory options for examination and further analysis of the cause, extent, and significance of the cracks, such as direct visual examination, direct measurement, direct sampling, etc. In effect, evidence of the cracking has been buried under inches or feet of concrete, due to FENOC's rush to re-start, and NRC's letting them get away with it.

In fact, in February 2014 the public has learned that, by leaving in place metal forms in late 2011, FENOC had concealed a 25-foot-long, 6 to 12 inch wide, air space or gap of yet-unknown depth through the 30-inch-thick Shield Building wall. The metal forms prevented visual examination of the gap. Thus, not only did the rushed resealing of the access opening involve an incomplete concrete pour – it also prevented visual examination and discovery of the very gap resulting from the rush-job. Thus, Davis-Besse operated at full power for over two years – from early December 2011 to Feb. 1, 2014 – with a significant void space in its shield building wall. Any effects on containment safety margins have yet to be adequately determined.

The public's faith in NRC regulation of FENOC's categorically lax QA management has been misplaced, and any presumption of intense regulatory scrutiny because of the cracking has, so far, been wrong. The February 2014 concrete void was the result of terrible oversight of sloppy workmanship in 2011. QA mismanagement in the form of the repeated honeycombing of the shield building, the lack of a comprehensive understanding of causation of shield building cracking, and serially cracked and broken rebar join other sensational events in Davis-Besse's operational history. These events point to the conclusion that QA mismanagement is, itself, an aging-related feature at Davis-Besse which must be addressed as a pernicious problem because of its potential to cause further difficulties and operational dangers. Strict and explicit plans for remediation of the QA management problem must be drawn up and analyzed both within the Safety Evaluation Report and the DSEIS discussion of severe accident mitigation alternatives (SAMA) for the plant. Much more intensive modifications to the Shield Building Monitoring Program and the Structures Monitoring Program Aging Management Plans (AMPS) are unquestionably also obligatory now.

At ¶ 25 of Intervenors' Motion for Admission of Contention No. 5 (p.26), Intervenors noted:

If the shield building loses its ability to perform its safety- and security-related functions, Davis-Besse should be immediately shut down, of course. But this very risk, the potential loss of shield building safety and security function over time, is exactly the kind of analysis that should be included in FENOC SAMA analyses regarding the Davis-Besse license extension. Such analyses have not been done. Similarly, the potential for Davis-Besse's cracked shield building to cause its early retirement, before its current license expiration in 2017, or before its extended 2037 license expiration proposed by FENOC, should be addressed by FENOC's reliability analyses, and its energy alternatives analyses. For, if Davis-Besse's days are numbered, due to its cracked shield building, then Intervenors' wind, solar, and compressed air energy storage contentions increase in merit. FENOC, and the Region of Interest as a whole, should be preparing now to replace Davis-Besse and the NRC should reflect such a reality through its own independent

analysis in the Draft Environmental Impact Statement on the license extension proposal. FENOC's SAMA analyses assume a safe, sound shield building capable of fulfilling its containment function. But the severe cracking known since October 2011, combined with wall gaps in the repeatedly sealed access openings in 2002 and 2011, critically undermines all optimistic assumptions.

As Intervenors have maintained throughout this license extension proceeding, Davis-Besse's future, from AMPs to SAMA analyses, requires fundamental re-evaluation.

Mark Cooper, an energy economist at Vermont Law School, warned on April 10, 2014 that nuclear utilities must plan for replacement power – as from efficiency upgrades and development of renewable sources of electricity – in advance of the inevitability that atomic reactors will one day close, lest the stability of our electric grid lurches from crisis to crisis. In July 2013, Cooper identified Davis-Besse as one of a dozen reactors at high risk of near-term shut down, due to such factors as economics (cost, old age, stand alone status, and a 25-years-or-less future even if it gets an extension), operational factors (lack of reliability, long-term outages), and as well, multiple safety factors.<sup>7</sup>

A petitioner does not have to prove contentions at the admissibility stage. *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), CLI-04-22, 60 NRC 125, 139 (2004). The factual support required is “a minimal showing that material facts are in dispute.” All that is needed at this juncture is “alleged facts” and the factual support “need not be in affidavit or formal evidentiary form and need not be of the quality necessary to withstand a

---

<sup>7</sup>See Exhibit ES-1: Retirement Risk Factors of the Nuclear Fleet, page iv, posted online at <http://216.30.191.148/071713%20VLS%20Cooper%20at%20risk%20reactor%20report%20FINAL1.pdf>.

summary disposition motion.” *First Energy Nuclear Operating Company* (Davis-Besse Nuclear Power Station, Unit 1), ASLBP No. 11-907-01-LR-BD01, LBP-11-13 at 17 (April 26, 2011).

Here, the evidence in support of admission of Contention 6 is considerable, and easily surpasses the threshold to be accepted for adjudication.

**WHEREFORE**, Petitioners pray the Atomic Safety and Licensing Board admit Contention 6 for full adjudication.

*Executed in Accord with 10 C.F.R. § 2.304(d)*

Terry J. Lodge (OH #0029271)

316 N. Michigan St., Ste. 520

Toledo, OH 43604-5627

(419) 255-7552

Fax (419) 255-7552

Tjlodge50@yahoo.com

Counsel for Intervenors

**CONSULTATION PURSUANT TO 10 C.F.R. § 2.323(b)**

Undersigned counsel hereby certifies that he made a sincere attempt to consult with opposing counsel in an effort to resolve the concerns raised in the foregoing Motion. Counsel for the NRC Staff and FirstEnergy Nuclear Operating Company both indicated during a meet-and-confer phone conference on April 14, 2014 that they did not have sufficient information to determine whether to support the Motion, or not, and so each stated that they would oppose it.

*Executed in Accord with 10 C.F.R. § 2.304(d)*

Terry J. Lodge

Counsel for Intervenors

**UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION**

In the Matter of	)	Docket No. 50-346-LR
FirstEnergy Nuclear Operating Company	)	April 21, 2014
Davis-Besse Nuclear Power Station, Unit 1	)	
	)	

\* \* \* \* \*

**CERTIFICATE OF SERVICE**

I hereby certify that a copy of the foregoing “MOTION FOR ADMISSION OF CONTENTION NO. 6 (SHIELD BUILDING CONCRETE VOID, CRACKING AND BROKEN REBAR DISCOVERIES)” was deposited in the NRC’s Electronic Information Exchange this 21st day of April, 2014.

Executed in Accord with 10 C.F.R. § 2.304(d)  
Terry J. Lodge (OH #0029271)  
316 N. Michigan St., Ste. 520  
Toledo, OH 43604-5627  
(419) 255-7552  
Fax (419) 255-7552  
Tjlodge50@yahoo.com  
Counsel for Intervenors