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**Re: Severe and Worsening Cracking of Davis-Besse Atomic Reactor's Concrete
Containment, in Light of Nov. 4-7, 2015 NRC ACRS Meeting**

FAUSTIAN FISSION:

***Forcing ratepayers to pay a multi-billion dollar bailout for two more decades of
radioactive Russian roulette on the Great Lakes shoreline is an outrage!***

[From November 4-7, the U.S. Nuclear Regulatory Commission \(NRC\) Advisory Committee on Reactor Safeguards \(ACRS\) met](#) at the agency's headquarters in Rockville, MD near Washington, D.C., regarding FirstEnergy Nuclear Operating Company's (FENOC) contested application for a 20-year license extension at its problem-plagued Davis-Besse atomic reactor, located on the Lake Erie shore in Oak Harbor, OH. I attended the main session, in person, on the afternoon of Nov. 4, as did other public watchdogs from across the country, by phone. [Please see the notes I took regarding the presentations made by FENOC, NRC staff](#), and the concerns and questions raised by ACRS members.

Beyond Nuclear, along with Citizens Environment Alliance of Southwestern Ontario, Don't Waste MI, and the OH Green Party, represented by Toledo attorney Terry Lodge, has officially intervened against the license extension for the past five years. [\(Sierra Club joined the coalition in 2013, to challenge Davis-Besse's risky, experimental steam generator replacement; Arnie Gundersen, Chief Engineer at Fairewinds Associates, served as the expert witness.\)](#)

BILLION DOLLAR BAILOUT FOR FATALLY FRACTURED REACTOR

FENOC has applied to the Public Utilities Commission of Ohio (PUCO) for more than \$3 billion in ratepayer subsidies, to prop up its age-degraded and uncompetitive Davis-Besse reactor, as well as coal burning power plants. As shown below, Davis-Besse's severely cracked, and ever worsening, concrete containment alone would

likely cost more than \$3 billion to replace. A similarly fatally fractured concrete containment would have cost billions to replace, leading to the permanent shutdown of the Crystal River atomic reactor in Florida in 2013. Yet, Davis-Besse continues to operate, and is seeking permission to do so till 2037.

But not one cent of that massive bailout, if secured, would go towards repairing or replacing the Shield Building. FENOC's only so-called 'Corrective Action,' or 'Aging Management Plan,' is a woefully inadequate, *ad hoc* monitoring program, with major, willful blind spots. Unless FirstEnergy's nuclear lobbyists are able to convince state and federal legislators to repeal the law of gravity, it is clear that Davis-Besse's heavily subsidized, extended operations would represent an unacceptable safety risk to Ohioans, Michiganders, Ontarioans, and beyond, including the Great Lakes drinking water supply for millions of people in two countries downstream.

NO NUCLEAR WASTE CONFIDENCE

Beyond Nuclear, represented by D.C. attorney Diane Curran and Turner Environmental Law Clinic director Mindy Goldstein of Atlanta, are currently challenging NRC's Nuclear Waste Confidence policy at the U.S. Court of Appeals for the District of Columbia Circuit, the second highest court in the land, just under the U.S. Supreme Court. This lawsuit represents another serious challenge to Davis-Besse's license extension.)

NRC CHECK BOX RUBBER-STAMPS FOR 20-YEAR LICENSE EXTENSIONS

NRC's ACRS, its Director of Nuclear Reactor Regulation, and the agency's four Commissioners themselves, appear poised to check off [the final remaining boxes on Davis-Besse's 2017-2037 license extension](#) approval, despite a long list of major safety concerns. The top safety concern, severe and worsening cracking of the concrete containment Shield Building, has turned what would have almost certainly been a two-year, *pro forma* rubber-stamp process, into an agonizing five-year and counting ordeal. Davis-Besse's current 40-year (1977-2017) license expires on Earth Day (April 22), 2017. The problem-plagued reactor should retire, as planned, on that date, at the very latest. It's cracked, dysfunctional containment makes current operations unacceptably risky, let alone 22 more years.

Despite the passage of more than four years since the cracking was first revealed, even basic questions remain unanswered by the company and the agency. ACRS members' questions and concerns, at both [the 9/23/15 ACRS subcommittee meeting](#), and this week's full committee meeting, have echoed concerns our environmental coalition has been raising for many years. However, ACRS is infamous for asking tough questions, and then accepting lousy answers. After all, ACRS has signed off on some 75 reactor license extensions already in the U.S., in just the past 15 years, at such notoriously risky reactors as Vermont Yankee, Oyster Creek in NJ, Pilgrim in MA, and FitzPatrick in NY – all age-degraded Fukushima

Daiichi twin designs (General Electric Mark I boiling water reactors) – and all now either already closed, or slated for permanent shutdown in the near future, despite NRC and ACRS rubber-stamped license extensions.

SNOW JOB AND WHITE WASH

FirstEnergy's Blizzard of 1978 root cause theory was a Snow Job of Convenience, which successfully, though wrongfully, blocked our intervention before the NRC Atomic Safety and Licensing Board (ASLB), by falsely denying that the cracking was aging-related. Neither FENOC nor NRC has ever answered our questions regarding 27 other potential contributing root causes.

FENOC's two-year long denial was blown out of the water by evidence of crack growth in August-September 2013. It turns out that the White Wash of 2012 -- the application of weather sealant to the Shield Building exterior, 40 years too late -- locked water in the walls, leading to a half-inch, or more, of ice-wedging crack propagation, every time it freezes. This adds up to a startling nine inches per year of crack growth, FENOC has now admitted.

COVERING UP, AND LOCKING IN, THE WATER IN THE WALLS

FENOC knew about the water in the walls in early 2012, but proceeded with its White Wash between August and October 2012, despite warnings by concerned citizen watchdogs, raised at interactions between the public, the company, and the NRC earlier that year, that the weather sealant could have unintended negative consequences. Sure enough, the White Wash locked the water in the walls, causing the ice-wedging crack propagation. FENOC simultaneously denied, vociferously, that the cracking could possibly grow worse, blocking our environmental coalition's ASLB intervention throughout all of 2012 ([see our many filings of 2012](#)), and most of 2013. However, in August-September 2013, FENOC detected cracking growth. It kept the water in the walls secret, from early 2012 till July 2014, when it finally published its third, ever-evolving root cause report – the Full Apparent Cause Evaluation, revealing the ice-wedging crack propagation. Despite this, the ASLB nonetheless has continued to block our intervention, refusing to grant us a hearing on the technical merits of our cracking contentions, right up to the present.

ORWELLIAN NUKESPEAK: DOWN THE MEMORY HOLE

FENOC now claims, with a straight face, that 'It was identified at that time [in late 2011] that safety related structures including the Auxiliary Building and possibly the Borated Water Storage Tank (BWST) could be affected by falling concrete sections or even by the separation of an entire shoulder.' [[See page 2 of 16 of this recent FENOC document.](#)] Funny thing, though, is FENOC forgot to tell that to the many hundreds of concerned local residents, and the large number of media reporters, who attended the January 2012 Camp Perry, and the August 2012 Oak Harbor High School, NRC meetings, hard won by Congressman Dennis Kucinich

(Democrat-Cleveland). To the contrary, FENOC denied any such risks, despite repeated warnings raised by our environmental coalition, throughout the ASLB proceeding, for the past four years. NRC staff joined FENOC in such denials. And the ASLB swallowed such denials hook, line, and sinker, itself repeatedly denying us a hearing on our multiple contentions and major legal filings.

In response to the Feb. 28, 2012 revelation that FENOC's predecessors had decided, in 1969, not to weather seal the Shield Building, Kucinich also pointed out that 'Everyone in northern Ohio knows, you've got to paint your porch!' FENOC's only answer as to why the most safety-significant building at Davis-Besse was not weather sealed, while most others were, was that it was done for aesthetic or cosmetic reasons, as those other buildings looked 'splotchy.' No mention was made as to the money saved by not weather sealing the Shield Building in the first place. FENOC and even NRC have clung, for four years, to the calming line that the severely cracked, to the point of falling off, flute shoulders on the Davis-Besse Shield Building, are merely architectural, not structural. Well, they play a structural function now, or a structural dysfunction, to be precise. They have introduced severe and worsening cracking into the Shield Building walls, now threatening to undermine the structural integrity of the entire radiological containment.

Such revisionist history, aided and abetted by NRC's own 'down the memory hole' Nukespeak behavior, is quite Orwellian.

COLLUSION AS ROOT CAUSE OF NUCLEAR CATASTROPHE

What comes to mind, frighteningly, is the Japanese Parliament's conclusion, after a year-long independent investigation, that the root cause of the Fukushima Daiichi nuclear catastrophe, was collusion between the regulatory agency, the nuclear utility, and government officials. Collusion was cited as the reason the three reactors were so very vulnerable to the 3/11/11 one-two punch of natural disasters, earthquake and tsunami, that so quickly led to their meltdowns and catastrophic radioactivity releases in the hours and days to follow, an ongoing radioactive catastrophe, especially for the Pacific Ocean, with no end in sight. Such collusion, between FENOC and NRC, exists in spades at Davis-Besse, at the great peril of countless communities living downwind and downstream.

NUCLEAR RUST-U-LATORY COMMISSION

For example, [our concerns about rebar corrosion](#), and the potential for up to six-fold expansion of the corroding steel, and resulting damage and loss of bond between the rebar and concrete, was attacked by FENOC and NRC, and [quickly dismissed by ASLB](#). Now, ACRS is about to join with NRC staff in signing off on FENOC's stated 'Aging Management Plan' to only undertake 'Opportunistic visual inspections of rebar near laminar cracking.' In his book *Concrete Planet: The Strange and Fascinating Story of the World's Most Common Man-Made Material* (Prometheus Books, 2011), Robert Courland warned that rebar-reinforced concrete contains the

seeds of its own destruction. FENOC has made the unacceptably optimistic assumption that Davis-Besse's Shield Building rebar is not corroding, despite the severe cracking and corrosive water locked in the walls. These facts on the ground would indicate otherwise. NRC and ACRS are playing along with this most risky 'don't look, don't find' approach. This is even more egregious, after the early 2012 revelations of FENOC mistakes in preparing Shield Building breach replacement rebar, as well as the early 2014 revelations of rebar damage in the Shield Building wall's construction opening. ([A Shield Building wall gap](#), extending a full two feet into the 2.5 foot thick wall, was revealed at the same time as the rebar damage. Thus, Davis-Besse had a very vulnerable 'soft spot' in its concrete containment, during full power operations, from Dec. 2011 to Feb. 2014. A tornado-driven missile, for example, could have penetrated it, or the pressure build up from a core meltdown could have breached it.)

WILLFUL BLINDNESS, BROKEN PROMISES, AND PENCIL-WHIPPING

Another example of such willful blindness is FENOC's refusal to update its now obsolete 2012 Impulse Response mapping of the Shield Building. [As David Lochbaum, Director of the Nuclear Safety Program at Union of Concerned Scientists, has put it](#), 'one needs to know the extent of cracking to establish a CREDIBLE design basis calculation. It's not apparent that FirstEnergy has truly defined the extent of laminar cracking. Hence, it's not clear that they have a credible design basis calculation...".

Lochbaum's insights hit the bull's eye. NRC internal emails from late 2011 – obtained only months later via Beyond Nuclear's Freedom of Information Act request, revealed staff members' agonizing over how to allow a rushed restart of the Davis-Besse reactor, when its Current Licensing Basis and Design Basis were so clearly violated by the cracking. ([See the FOIA docket.](#)) Yet allow it they did, and allow it they have, for four long years now. For a summary of the risky, rushed restart, despite the countless unanswered questions regarding the cracking, see Beyond Nuclear's August 8, 2012 backgrounder, ["What Humpty Dumpty Doesn't Want You to Know: Davis-Besse's Cracked Containment Snow Job."](#)

At the Oak Harbor High School public meeting in August 2012, NRC and FENOC promised a plan for restoring the Current Licensing Basis and Design Basis for the Shield Building, by December 2012. That did not happen, of course. It still has not. But the 'plan' is clear now: FENOC plans to submit a License Amendment Request to NRC in the near future, in an attempt to make everything appear fine, on paper at least. *Associated Press* investigative reporter Jeff Donn exposed such NRC regulatory rollbacks, and industry pencil-whipping, in his [June 2011 series 'Aging Nukes.'](#)

Ironically enough, Bechtel, the contractor that led the decision-making in 1969 to not weather seal the Shield Building in the first place, has been tapped to carry out the safety-related calculations, supposedly proving structural integrity, despite the

severe and worsening cracking. (See, for example, [calculation C-CSS-099.20-055, Rev. 1, "II/I Evaluation for Architectural Flute Shoulder."](#))

EXPOSING SEISMIC RISKS

Such attempts to deny seismic risk at the severely cracked Shield Building were belied by NRC staffer Abdul Sheik, way back in [November 2011, in an internal email obtained by FOIA](#), that we have pointed to many times in testimony to ASLB, and now ACRS.

But Beyond Nuclear's FOIA request also revealed that the [ACRS itself has had concerns about seismic risk at Davis-Besse, pre-dating operations in the 1970s](#).

But such denials have continued, even though FENOC, NRC staff, and the ACRS subcommittee on 9/23/15 discussed the overriding importance of seismic risks, given the Shield Building cracking. For example, during the 11/4/15 ACRS meeting, claims were made by agency and company license extension proponents that Davis-Besse is "not [located] in a high seismic region." ([see Kamps' notes](#), bottom of page 4/top of page 5).

But such a position is ill informed. Davis-Besse's sister atomic reactor, FENOC's Perry nuclear power plant to the east of Cleveland on the Lake Erie shore, [was hit by a 5.0 magnitude quake on Jan. 31, 1986; by a 3.4 magnitude quake on June 20, 2006; and also felt the August 23, 2011 5.8 magnitude quake](#) epi-centered many hundreds of miles away in Mineral, VA. Early historical records, and Native American oral history, also indicate that northern Ohio was significantly impacted by the 8.0 magnitude range, or even stronger, earthquakes caused by the New Madrid fault line, epi-centered in Missouri, just over two centuries ago – a fault line at increasing risk of causing another major earthquake this century. But those were natural earthquakes.

What about artificial earthquakes in Ohio, as due to fracking-related activities? [The 4.0 magnitude earthquake epi-centered in Youngstown, OH on 12/31/11 was quickly confirmed to be due to human activities](#).

Such fracking-related activities have continued since, including in Ohio. A recent presentation before the U.S. Nuclear Waste Technical Review Board meeting held in Washington, D.C. focused on the risks of artificial earthquakes due to fracking-related activities, as evidenced in very large numbers in Oklahoma, to such proposals as Deep Borehole Disposal of highly radioactive wastes. Thus, Davis-Besse may well be located in a region of evolving, ever increasing seismic activity, due to human activities alone, not to mention natural seismic risks. Obviously, such risks to Davis-Besse's cracked Shield Building cannot be so flippantly dismissed.

WHAT HAS THE LARGEST CRACK?

Another example of NRC's incompetence, or worse, was made manifest by a starkly revealing moment during the ACRS meeting. At 2:30 PM Eastern time, the ACRS Chairman, John Stetkar, abruptly called for a 15-minute break, so that the large number of assembled NRC staff could huddle and clarify their answer to pointed ACRS questions regarding unacceptable limits to crack widening. NRC staff had been so blatantly unable to satisfactorily answer ACRS's questions, revealing a startling lack of clarity regarding the safety-significance of crack width, that the ACRS chairman had to point it out to them, explicitly (this exchange is captured in [my notes from the meeting](#), at the bottom of page 11 and top of page 12; the meeting transcript (to be released in two to three weeks) will, presumably, clearly record this troubling exchange).

Referring to the adding of more and more core bores, to try to stay ahead of the ever expanding cracking's leading edges, [Lochbaum added](#) 'FirstEnergy does not have their arms around this situation...If these antics constitute having a "solid understanding" of the "extent of laminar cracking," what would merely guessing look like?'

Lochbaum concluded, *'the real question that ACRS should seek to answer is what has the largest crack?'*

A) *The Shield Building at Davis-Besse*

B) *The Shield Building Monitoring Program for Davis-Besse*

C) *All of the above.*

Even dead, Shakespeare knows the answer to be B.

If information is power, FirstEnergy seems powerless to understand the extent of laminar cracking and therefore properly manage aging effects.'

IS DAVIS-BESSE UNIQUE?

As 'unique' as Davis-Besse's Shield Building cracking 'operating experience' is, one must wonder how many more unsealed concrete containments at atomic reactors across the Great Lakes, and beyond, there are, and whether or not they too suffer hidden, sub-surface cracking, calling the concrete containments' structural integrity into question.

MISCELLANEOUS MENACES

But Davis-Besse's 'unique' cracking problem is not its only worsening risk. The epidemic of corrosive borated water leaks has corroded the Inner Steel Containment

Vessel. Davis-Besse's high-level radioactive waste storage pool is on a short list of leakers in the country. Reactor pressure vessel (RPV) embrittlement, loss of fracture toughness of the RPV, and the ongoing risky experimental steam generator replacement, all come to mind.

FAUSTIAN FISSION

FENOC has requested PUCO to allow it to bill ratepayers over \$3 billion, over the course of the next 15 years, to prop up Davis-Besse, and coal plants like Sammis. Often, the jobs, tax revenues for local municipalities, and – in the case of atomic reactors like Davis-Besse – the supposedly carbon-free electricity, are pointed to as the benefits worthy of such massive subsidization by consumers and businesses.

But what are the downsides? What are the opportunity costs?

As NIRS and AGREE have shown in the context of the FitzPatrick reactor shutdown in NY, where \$40-60 million per year in public subsidies are sought by Entergy Nuclear to keep the uncompetitive reactor operating, there are better options for meeting goals such as job retention and creation, alternative tax revenues, and carbon-free electricity generation.

NIRS and AGREE showed that energy efficiency upgrades and wind power could readily replace FitzPatrick's electricity, with money left over to phase out even more greenhouse gas emitting fossil fuel combustion from the electric sector, for the same amount proposed to subsidize the failing reactor.

Likewise, the environmental coalition intervening against Davis-Besse's license extension, with the help of University of Toledo professor emeritus Dr. Al Compaan and his students, showed five years ago that wind power alone ([see "Wind Power," beginning on Page 10](#)), [solar photo-voltaics alone](#), and [certainly the two together](#), could readily and affordably replace Davis-Besse's 908 Megawatts of electricity. The Lake Erie shoreline of northern Ohio has some of the best wind power potential in the U.S. FirstSolar, one of the largest manufacturers of solar PV panels in the U.S., is based in Toledo.

[The current issue of *National Geographic*](#) has a major article about Germany's energy transformation – the phase out of nuclear power and fossil fuels, and their replacement with efficiency and renewables, such as wind and solar. If the fourth biggest economy in the world can do it, certainly Ohio can too. In fact, [Dr. Arjun Makhijani of IEER showed eight years ago, that the entire U.S. economy could do it.](#)

Ratepayers are being asked to pay through the teeth for Davis-Besse's continued operations, for two more decades. This means households and businesses paying to be put at ever increasing radioactive risk.

And these risks are potentially catastrophic. As revealed by the CRAC-2 report (the most common name for the “Calculation of Reactor Accident Consequences,” officially known as the 1982 Sandia Siting Study or as NUREG/CR-2239), a large-scale radioactivity release at Davis-Besse could cause mass casualties (1,400 peak early fatalities; 73,000 peak early injuries; 10,000 peak latent cancer deaths) and \$84 billion in property damage. When adjusted for inflation, that property damage figure would now surmount \$203 billion. And, as reported by Jeff Donn of AP in June 2011, [populations have soared around nuclear power plants](#) in the U.S. since that 1982 study, so casualties would be even worse today, if the worst happens.

As revealed by Dave Lochbaum’s [“bathtub curve,”](#) catastrophic accidents at atomic reactors grow more likely with age-related degradation. As a matter of fact, [Lochbaum cited Davis-Besse’s own Hole-in-the-Head lid corrosion close call with catastrophe](#) as a case in point.

[Northern Ohio has dodged way too many radioactive bullets at Davis-Besse over the past 38 years.](#) The prospect of 22 more years of radioactive Russian roulette on the Lake Erie shore, with a cracked concrete containment, and paid for by a multi-billion dollar ratepayer bailout, is outrageous, and must be prevented.