



DAVIS-BESSE NUCLEAR REACTOR

*Ohio Sierra Club Nuclear Free Committee
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The Davis-Besse nuclear reactor is located on Lake Erie in Oak Harbor, Ohio, 20 miles east of Toledo. It is an 894-megawatt commercial nuclear power plant. In 2015 the Nuclear Regulatory Commission (NRC) granted FirstEnergy a license extension to operate Davis-Besse 20 years beyond its engineered lifespan of 40 years. Davis-Besse's onsite high-level radioactive waste will increase by about 30 tons per year.

ACCIDENTS AND VIOLATIONS: Davis-Besse has been plagued with accidents and violations, starting before it began operations.

- In 1972 a strong wind caused lake water to flood the construction site for a month. A repeat with the reactor in operation could be disastrous.
- Davis-Besse has had six “significant accident sequence precursors” out of 34 total in the U.S.
- In Oct. 1977 a pilot operated relief valve stuck open in an incident almost identical to the cause of the 1979 meltdown at Three Mile Island (TMI). Had the NRC asked all similar pressurized water reactors to correct this problem, the TMI incident could have been avoided.
- In June 1985 a potentially catastrophic 12-minute loss-of-coolant event idled the plant for more than a year. The NRC referred to the accident as the worst since Three Mile Island.
- A direct hit by a tornado in 1998 caused complete loss of outside electric power and destroyed the alert, communication and emergency systems and threatened a meltdown.
- In 2002 a delayed inspection found that boric acid had eaten through 7 inches of the steel reactor lid, with only a bulging 3/16-inch steel liner preventing a radioactive catastrophe. A photo was found, taken earlier, that showed major corrosion on the outside of the vessel, but this was ignored. This “Hole-In-The-Head” fiasco resulted in the largest fine in NRC history – \$33.5 million. The plant was idled for 2 years, costing ratepayers \$600 million.
- In 2003 FirstEnergy's failure to trim trees along transmission lines caused the second largest power outage in U.S. history, impacting 55 million Americans and Canadians.
- The reactor head was replaced twice due to cracking.



Davis-Besse construction site floods in 1972.

SHIELD BUILDING CRACKING AND VOIDS: In 2011, evidence showed that the concrete shield building around the reactor was cracking. FirstEnergy maintained that the cracks were “architectural, not structural.” The NRC allowed a restart without knowing the cause of the cracking.

- The shield building has been cut into 4 times to replace aging parts. Each cut further weakened the building, causing 26 sections of rebar to be broken or cracked.
- In 2012 FirstEnergy said that cracks occurred because a failure to paint the building allowed the blizzard of 1978 to force water into the concrete which then froze. They insisted that cracks were not spreading. Inquiries later found that FirstEnergy had evidence of cracking a year before the blizzard.
- In a later report, FirstEnergy noted that cracks are spreading. Causes? A new paint job had sealed in water, which was freezing and thawing. Use of the wrong type of cement and the plumb of the building being outside of tolerance also contributed.
- In 2014 a honeycomb void was found in the concrete, measuring 25 feet long and between 6 and 12

inches wide in a wall 2.5 feet thick. Earlier records of voids, never made public, were discovered.

- Two NRC engineers calculated that during a minor earthquake or accident, up to 90% of the 2.5-foot thick shield building wall could collapse into rubble on top of the reactor.¹

In September, 2015 FirstEnergy submitted a license amendment request to keep the reactor operating with a shield building that fell outside design criteria. NRC not only granted this request, they approved the 20-year operating extension 3 months later. After the extension was granted, FirstEnergy admitted that cracks were spreading.



Humpty Dumpty is Cracked

FLAWED REPLACEMENT STEAM GENERATORS: In 2013, the Sierra Club, Beyond Nuclear, and Don't Waste Michigan jointly legally challenged the engineering of two replacement steam generators. Although regulations require that replacement steam generators be “like-for-like” with the original, the new ones weighed 590 tons compared to 465 tons for the originals. A new alloy, Inconel 690, was used for the tubing. Expert witness [Arnold Gundersen identified 9 significant, experimental modifications](#) to the original design. Despite these findings – or perhaps because the steam generators were already constructed – the NRC approved their use at Davis-Besse. They were installed in March of 2014.

HIGH BURNUP FUEL: Davis-Besse is now using “high burnup” nuclear fuel, which has been approved by the NRC for about 20 years. High burnup is burned at hotter temperatures for a longer period of time. [High burnup fuel has even more serious safety and waste storage](#) issues than traditional low burnup nuclear fuel.

- High-burnup waste is over twice as radioactive and over twice as thermally hot as traditional low burnup fuel waste, requiring 7 to 20 years of cooling in fuel pools, compared to 5 years for low burnup fuel.
- More space is required between high burnup fuel assemblies in the fuel pools, which already contain up to 5 times as many fuel assemblies as they were engineered to hold.
- High burnup temperatures damage both fuel and cladding, making it unstable for transport.
- Hydrides are created in high-burnup fuel cladding that increase risks for hydrogen gas explosions.

UNSAFE WASTE STORAGE: Radioactive waste from Davis-Besse will need to be shielded from the environment for hundreds of thousands of years. Dry casks are used when waste is cooler and can be moved out of fuel pools. The NRC has approved 1/2” to 5/8” thin stainless steel canisters for dry cask storage. Unbelievably, these canisters cannot be inspected, monitored or repaired. Over 25 of these canisters are stored at Davis-Besse. More of these canisters are being used because they are cheaper. [Each holds a Chernobyl's-worth of cesium.](#)

NRC CONTINUES TO GIVE WAIVERS ON SAFETY AND MAINTENANCE: Dozens of NRC exemptions include longer periods between inspections, longer times between leakage tests, emergency plan updates not required, no implementation of flooding deterrence and other recommendations from Fukushima Lessons Learned, exemptions from record retention requirements, and exemption from the Definition of Physical Barrier—barbed wire is OK at Davis-Besse.



This is what inspectors ignored.



Later, this football-sized hole was found in the head of the reactor.

¹ [Intervenors' Fifth Motion to Amend and/or Supplement Proposed Contention No. 5](#) (Shield Building Cracking), Aug. 16, 2012 pp. 37-41

If you are reading this in print, the hyperlinked references can be found on the Sierra Club Grassroots Network by searching for the Nuclear Free Campaign and viewing the team documents.