

I noted the danger of reactor vessel cracking like a piece of glass due to thermal shock due to embrittlement.

Dominion's spokesperson misspoke about the reason for the Rowe reactor shutdown. (He really did more than that, but I will be polite here.) It had everything to do with embrittlement.

SEE:

<http://palisades.homestead.com/files/UCS.pdf>

"Embrittlement is the issue that compelled the owners of the Yankee Rowe." nuclear plant to permanently shut it down in September 1991.

This is also why Zion was closed.

For a general read on embrittlement issues and steam generator tubes --which I stated involved a game of Russian roulette.

<http://allthingsnuclear.org/dlochbaum/nuclear-plant-aging>

For a general history for Palliadees Plant which address many aspects of my concerns. See the following. Millstone II and III will not be far behind.

:Introduction

Nuclear watchdog groups have long been concerned about Pressurized Thermal Shock (PTS) risks due to the worst embrittled reactor pressure vessel (RPV) in the U.S., at Palisades, located on the Lake Michigan shoreline.

As described in a July 9, 1981 AP article (see below), "A severe overcooling and repressurization accident involving a weak vessel in one of the pressurized-water reactors could cause the reactor vessel--which contains the radioactive fuel rods used to produce heat and electricity--to crack like a hot glass jar thrust into cold water, officials of the Nuclear Regulatory Commission said in interviews this week."

A sudden decrease in temperature due to Emergency Core Cooling System activation, the consequent decrease in the intense pressure, followed by sudden re-pressurization (Pressurized Water Reactors, PWRs, operate at around 2,200 pounds -- or a ton -- of pressure per square inch) on the neutron radiation-embrittled metal of the RPV, could fracture it. A Loss of Coolant Accident (LOCA) would follow, then reactor core meltdown, risking containment failure and catastrophic release of hazardous radioactivity downwind, downstream, up the food chain, and down the generations.

The longer Palisades operates, the worse its risk of a breakdown phase accident, as due to PTS. (See Union of Concerned Scientists' "[Bath Tub Curve](#)" -- due to the curve's shape -- of break-in and breakdown phase risks, including nuclear power "[data points](#)," such as Three Mile Island Unit 2, Chernobyl, Davis-Besse's hole-in-the-head fiasco, and Indian Point's [steam generator tube rupture](#).)

<http://www.beyondnuclear.org/nrc/2013/8/8/beyond-nuclear-warns-nrc-against-weakening-rpv-embrittlement.html>

For detailed technical discussion.

<https://www.nrc.gov/docs/ML0037/ML003713188.pdf>

Neutron irradiation embrittlement could limit the service life of some of the reactor pressure vessels in existing commercial nuclear-power plants. Improved understanding of the underlying causes of embrittlement has provided regulators and power-plant operators better estimates of vessel-operating margins. This article presents an overview of embrittlement, emphasizing the status of mechanistic understanding and models, and their role in increasing the reliability of vessel-integrity assessments. Finally, a number of outstanding issues and significant opportunities, including a new fracture-toughness master-curve method, are briefly described.

<http://iweb.tms.org/NM/JOM-0107-18.pdf>

If you wish great detail:

Irradiation Embrittlement of Reactor Pressure Vessels (RPVs) in Nuclear Power Plants provides a thorough review of an issue that is central to the safety of nuclear power generation. This a slog best left for engineers.