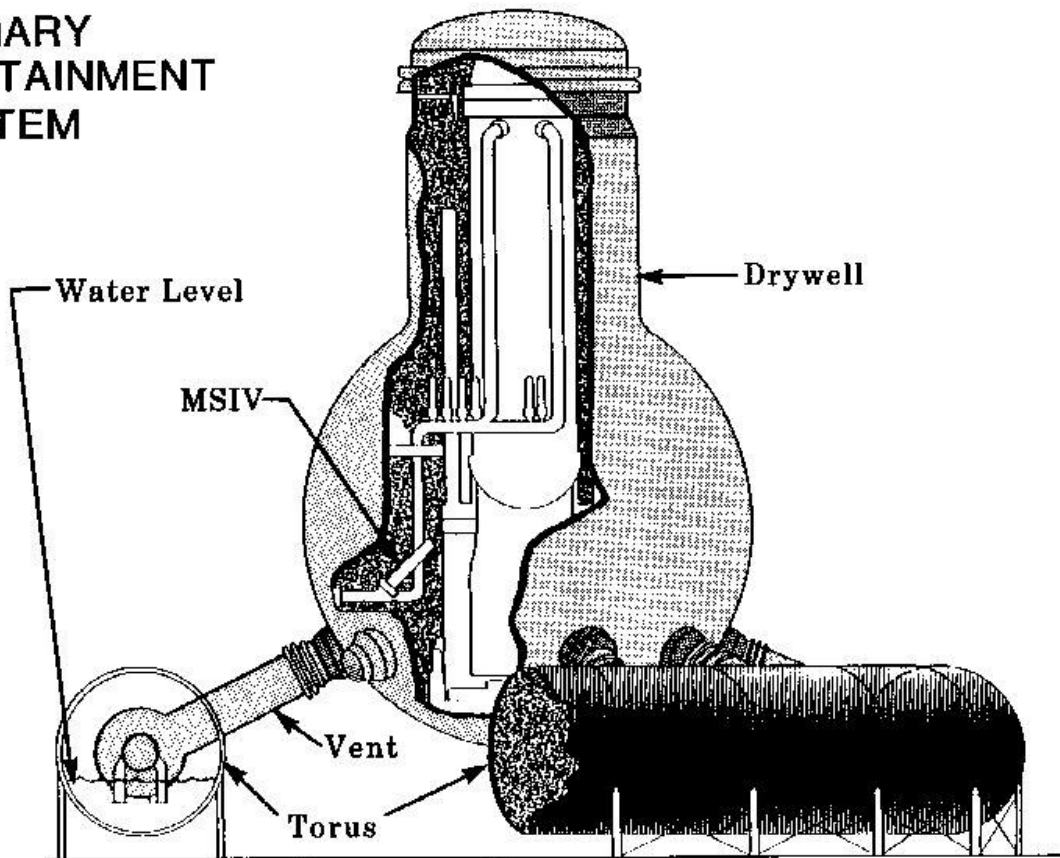




FITZPATRICK'S LEAKING DONUT

Nuclear Regulatory Commission (NRC) Daily Event Report No. 41815 dated June 30, 2005, stated that workers found a crack below the waterline of the torus at the James A. FitzPatrick nuclear plant in New York. After "further engineering analysis determined that operability of the primary containment was not assured," the reactor was manually shut down from full power. The crack challenged the structural integrity of the primary containment and forced the plant to be shut down.

PRIMARY CONTAINMENT SYSTEM



FitzPatrick has a boiling water reactor (BWR) manufactured by the General Electric Company. FitzPatrick is equipped with GE's Mark I primary containment design, sometimes called a lightbulb in a donut because of its shape. The primary containment completely surrounds the reactor vessel and consists of two major parts: the drywell and the torus. The drywell looks like an inverted lightbulb and is made of steel-lined reinforced concrete. The torus looks like a donut and is made of steel covered on the inside by a protective coating. The torus is partially filled with water. The drywell is connected to the torus via eight vent pipes.

If a pipe connected to the reactor vessel were to break, the primary containment is supposed to handle the energy released from the broken pipe. The fluid inside the piping is under very high pressure (over 1,000

pounds per square inch). This fluid quickly fills the drywell and begins pressurizing its atmosphere. The rising pressure forces flow down the vent pipes into the torus. The vent pipes open beneath the surface of the water in the torus, so the steam flow bubbles up through the water where it cools down and converts back to water. This pressure-suppression containment design uses water as a heat sink. Without this heat sink, the drywell would have to be much bigger to withstand the energy release without failing.

Workers found a through-wall crack in the torus about five feet below its waterline and a small puddle on the floor beneath the crack. The leak was discovered during a scheduled inspection of piping connected to the torus. The scope and frequency of the inspection program may be suspect. On July 28, 2003, Entergy asked the NRC for permission to perform integrated tests of containment integrity at FitzPatrick every 15 years instead of every 10 years (see ML0321701280 in NRC's ADAMS). In that request, Entergy described its inspection program for the primary containment as follows:

These inspections [of the drywell] provide a high degree of assurance that any degradation of the containment will be detected and corrected before it may provide a containment leakage path. The inspections to date have not identified degradation that threatens the structural integrity of the containment. [Attachment 6, page 5]

The existing material condition of the Torus is acceptable and does not compromise the structural integrity of the primary pressure boundary. ... The inspection results indicate that no significant corrosion effects have been experienced on the containment vessel. The inspections conducted to date have not identified degradation that threatens the structural integrity of the containment. [Attachment 6, page 6]

Clearly, the inspection program for the primary containment at FitzPatrick appears deficient because this event shows that it failed to assure "any degradation of the containment will be detected and corrected before it may provide a containment leakage path." A small puddle on the floor beneath a through-wall crack in the torus is rather compelling evidence the inspection program failed its mission. The inspection program is NOT supposed to find puddles – it is supposed to prevent puddles.

Speaking of not preventing puddles, the NRC approved Entergy's request to reduce the frequency of the integrated containment integrity testing at FitzPatrick (see ML0427202090 in NRC's ADAMS).

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