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NRC AMENDS REGULATIONS GOVERNING
EMBRITTLMENT OF REACTOR PRESSURE VESSELS

The Nuclear Regulatory Commission is amending its regulations governing radiation-induced embrittlement of pressure vessels in nuclear power plants licensed by the NRC.

Embrittlement is the loss of toughness of the thick steel in the pressure vessel. The steel, which is closest to the nuclear fuel inside the vessel, loses its toughness after being bombarded by neutrons from the reactor core over a period of years.

The amendments are, in part, a response to the review of the condition of the reactor pressure vessel in the Yankee Rowe nuclear power plant in Massachusetts, which was shut down permanently by the licensee in October 1991. They clarify and make corrections to the NRC's present requirements that nuclear power plant utilities take steps to protect against pressurized thermal shock--severe overcooling combined with or followed by significantly high pressure which, in extreme circumstances, could cause an embrittled vessel to crack.

In addition, requirements governing thermal annealing (heating) of reactor pressure vessels to mitigate the effects of embrittlement are added to the regulations. These annealing requirements address the critical engineering and metallurgical aspects of the technique by requiring licensees to submit a report describing proposed annealing work and, after the process is complete, confirm that the annealing was performed in accordance with that plan. Deviations would require a justification, approved by the NRC staff, for continued operation of the reactor pressure vessel.

Under one annealing approach, the nuclear fuel and control rods are removed and a furnace is lowered into the vessel. The vessel is heated to about 850 degrees and held at that temperature for about 168 hours to restore the toughness properties of the vessel wall.

An NRC regulatory guide will also be published to provide an acceptable thermal annealing operating plan, format and content.

The final rule will be effective on January 17.

This final regulation reflects consideration of comments received in response to a proposed regulation which was published in the Federal Register on October 4, 1994.

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