

28705 Hope Circle
Easton, MD 20610
October 12, 2022

Andrea D. Veil, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Ms. Veil:

Your letter of September 29, 2022, in reply to my earlier letter, was encouraging. It seems appropriate to consider fuel fragmentation, relocation, and dispersal (FFRD) in connection with proposed rulemaking for increased fuel enrichments. I understand that the clock will start ticking on that often-lengthy rulemaking effort in 2023.

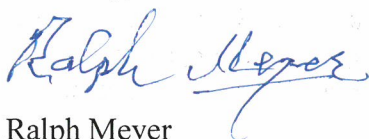
Although research on FFRD has been going on for more than a decade, it is only recently that my co-author and I presented evidence in a peer reviewed journal that the current safety analyses for loss-of-coolant accidents (LOCAs) do not work for high-burnup fuel. Maintaining ductility or strength in fuel rod cladding does not keep UO₂ fuel pellets in their separate fuel rods ensuring a coolable array, even for burnups being achieved today.

The current temperature and oxidation limits are not providing us with any meaningful safety assurance. As a long-time NRC worker in this area, I still feel responsible, and my agency is forcing the industry to aim at the wrong target. The target should be minimum fuel dispersal such that, overall, the fuel in the core remains in an easily coolable rod-like array.

At the present time, LOCA safety analyses do not tell us how much fuel is dispersed from fuel rods into the coolant – the current analyses are supposed to tell us it's zero, but we know for sure that that is not correct. Licensees could easily insert the correlation we published into their existing LOCA codes and count the number of rods that burst as they are calculating peak temperature and maximum oxidation. Based on test results to date, a few tens of centimeters of irradiated fuel are expected to be expelled through the opening of each burst rod. With this information in hand, we (NRC) could judge if the problem is serious enough to take some immediate action, or if we can afford to wait for rulemaking to take FFRD into account.

I hope you will ask licensees to report the calculated number of fuel rod ruptures along with their results for peak temperature and maximum oxidation. The technical basis for this request now exists in the published literature.

Sincerely,



Ralph Meyer
NRC (retired)