



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

September 2, 2014

Mr. John S. Alden  
5060 N. Marine Drive, Apt. D4  
Chicago, IL 60640

Dear Mr. Alden:

Thank you for your letter dated July 11, 2014 to NRC Chairman Allison M. Macfarlane describing your concept for a nuclear fuse passive safety system. Unfortunately heat generation in a nuclear reactor does not completely stop by inserting control rods. Although inserting control rods does shut down the fission chain reaction that produces most of the heat generation, there is another source of heat in nuclear reactors known as decay heat, which continues producing heat at lower but significant levels long after the reactor is shut down. Decay heat is produced by the radioactive decay of fission products produced in the reactor. For example, the control rods were successfully inserted into the reactors during the Three Mile Island and Fukushima accidents, but the fuel melted because of insufficient cooling to remove the decay heat. The concept of a thermal fuse has been used for emergency cooling systems in some reactor designs. In those cases, high temperatures cause a thermal fuse to melt and allow water to flow if there is a failure of the normal safety systems.

If you are interested in reviewing more information about reactor safety systems and reactor accidents, you may be interested in reading NUREG/CR-6042, "Perspectives on Reactor Safety." This document is the reference material for a training course offered to USNRC employees. It is available on the USNRC public website at URL:  
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/contract/cr6042/>

Thank you again for your interest in nuclear reactor safety.

Sincerely,

**/RA/**

Michael J. Case, Director  
Division of Systems Analysis  
Office of Nuclear Regulatory Research

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**/RA/**

Michael J. Case, Director  
Division of Systems Analysis  
Office of Nuclear Regulatory Research

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