



Department of
Engineering Physics
UNIVERSITY OF WISCONSIN-MADISON

INSTITUTE FOR
NUCLEAR
ENERGY SYSTEMS

Presents:
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Impact of radiation-induced changes in dimension, mechanical properties and composition of reactor structural components

Abstract. The economics and safety of nuclear reactors often is limited more by issues concerning structural materials than by fuel or nuclear issues. When subjected to neutron irradiation at elevated temperatures alloys used to construct the structural components of nuclear reactors undergo extensive changes in microstructure, microchemistry and often phase stability.

These microstructural and microchemical changes can lead to significant dimensional distortion and changes in volume of reactor components via the interactive processes of transmutation, radiation-induced precipitation, void swelling and irradiation creep. Additionally, there are often strong changes induced in the mechanical properties of structural steels.

A review of these phenomena and their impact on the continued functionality and lifetime of reactor structural components will be presented.

Biography: Frank Garner has five decades of experience in studying radiation damage phenomena in structural materials for all types of nuclear reactors and charged particle irradiation devices. Retired from Pacific Northwest National Laboratory since 2009, he currently holds three positions. He serves as half-time Research Scientist in the Nuclear Engineering Department of Texas A&M University and half-time Professor in the Department of Materials Science of Moscow Engineering Physics Institute in Russia. He is also President of Radiation Effects Consulting LLC, serving foreign and domestic nuclear entities.

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