Contribution ID: **53** Type: **Oral Presentation**

Criticality effects of storage patterns of spent nuclear fuel casks

Wednesday, 11 July 2012 11:15 (20 minutes)

Abstract content
   (Max 300 words)

When a number of units of fissile material, such as fuel assemblies or spent fuel casks containing fuel assemblies are stored together in an array, the neutron interaction among various units can render the array critical or even supercritical depending on the type of an array, enrichment, burnups etc. even though each unit may be subcritical when considered in isolation. This can subsequently lead to a chain of nuclear reactions which if not detected in time can eventually lead to a nuclear excursion. To prevent this it is of paramount importance that a storage array which takes into account all factors important to nuclear criticality safety such as fuel enrichment, burnup and distance among the casks is determined upfront. This paper will present the criticality effects of storing a number of spent fuel casks in various storage matrices and what the effects of varying any of the above parameters will be on the neutron multiplication factor (keff). The research was based on freshfuel and spent fuel with a burnup of 20GWD/MTU and 40GWD/MTU and the cooling period of 10 years. To study the effects of burnup credits on storage only the actinides were taken into account.

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yes

Level for award
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PhD

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Session Classification: NPRP

Track Classification: Track B - Nuclear, Particle and Radiation Physics