

NON-DESTRUCTIVE ASSAY OF EBR-II BLANKET ELEMENTS
USING RESONANCE TRANSMISSION ANALYSIS

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Abstract

Resonance transmission analysis utilizing a filtered reactor beam was examined as a means of determining the ^{239}Pu content in Experimental Breeder Reactor - II depleted uranium blanket elements. The technique uses cadmium and gadolinium filters along with a ^{239}Pu fission chamber to isolate the 0.3 eV resonance in ^{239}Pu . In the energy range of this resonance (0.1 eV to 0.5 eV), the total microscopic cross-section of ^{239}Pu is significantly greater than the cross-sections of ^{238}U and ^{235}U . This large difference allows small changes in the ^{239}Pu content of a sample to result in large changes in the mass signal response. Tests with small stacks of depleted uranium and ^{239}Pu foils indicate a significant change in response based on the ^{239}Pu content of the foil stack. In addition, the tests indicate good agreement between the measured and predicted values of ^{239}Pu up to approximately two weight percent.