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study of the transient and steady state thermal hydraulics analysis of the Low Enriched Uranium (LEU) core of Ghana Research Reactor-1 (GHARR-1)

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Countries seeking a quick bomb or would-be nuclear terrorists have eyes on poorly secured sites that contain significant quantities of high enriched uranium, (HEU). HEU is the material of choice for states or terrorists that seek to proliferate stealthily without testing their weapons. It is therefore critical to make current stocks of HEU as inaccessible as possible. One of the most effective long term approach is to eliminate it from as many locations as possible and convert the HEU cores to low-enriched uranium (LEU) core. The high enriched uranium core of the Ghana Research Reactor-1 has been converted to a low enriched uranium core. The transient and steady state thermal hydraulic analysis of the LEU core of Ghana Research Reactor -1 is presented in this work. The Monte Carlo N Particle code (MCNP-5) was used in obtaining neutronic parameters for the transient and steady state simulations. PARET/ANL was used in simulating transient responses of the GHARR-1 LEU core and PLTEMP/ANL was also used for the steady state simulations. Results obtained in both transient and steady state compared well with the experimental data.

Promotional text

The global concern on Nuclear Non-Proliferation has been heralded by a core conversion of HEU cores of Research Reactors to LEU cores, this paper focuses on thermal hydraulic evaluation of Ghana's LEU core after the core conversion.

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