

Criticality and Enrichment Supercritical Water Reactor (SCWR) With Uranium – Thorium Fuel

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A B S T R A C T

Research examined the criticality and enrichment supercritical water reactor (Super Critical Water Reactor) using thorium-uranium material has been done. The purposed of this study, knowing enrichment U^{233} on supercritical water reactor (SCWR) that the reactor is in a critical condition has indicated by the value of $k_{eff} = 1,00000$, knowing the fuel pin radius of supercritical water reactor (SCWR) to get burnup and efficient reactors were in critical condition indicated by the value of $k_{eff} = 1,00,000$, and analyzed breeding reactor has indicated by the increasing atomic density of U^{233} after burnup. This study are performed by a program to design the reactor SRAC code system. Data of fuel pin radius and moderators size is calculated by the PIJ in SRAC program. Results from this research that the reactor reached critical condition at 3.6% enrichment with k_{eff} 0.991635, if rounded to $\sim 1,00000$. Fuel pin radius who approached the critical is 0.4219 μm radius with k_{eff} 1.004902. The moderator who was in critical condition is 0.7016 μm radius with k_{eff} 1.004978, respectively burnup ~ 33009.5 MWD / ton. Atomic density of U^{233} and Th^{232} and other fission products such as U^{235} , U^{238} , and Pu^{239} . It can be concluded that the k_{eff} and burnup (MWD / ton) increase with U^{233} is loaded into the reactor core and the expansion of the size of the fuel pin and moderator radius. Reactor in this study can not be called a breeder because U^{233} atomic density decreased after burnup and has a value of BR <1 .

Keywords: criticality, enrichment, SCWR, fuel pin, moderator, keff, breeder.