

(19.14) The net efficiency of a 1000 MW_e BWR is 34.1%. Estimate the amount of ²³⁵U consumed during its first day of full power operation with a completely fresh load of fuel.

$$P_e := 1000 \cdot 10^6 \cdot \text{watt} \quad \eta := 34.1 \cdot \% \quad N_A := 6.022137 \cdot 10^{23} \cdot \text{mole}^{-1}$$

$$f_U := 3.1 \cdot 10^{10} \cdot \text{sec}^{-1} \cdot \text{watt}^{-1} \quad M_U := 235 \cdot \text{gm} \cdot \text{mole}^{-1} \quad P_{th} := \frac{P_e}{\eta}$$

$$t_{oper} := 1 \cdot \text{day} \quad \text{Rate} := P_{th} \cdot f_U \frac{M_U}{N_A} \quad \text{Rate} = 3.548 \cdot 10^{-5} \cdot \text{kg} \cdot \text{sec}^{-1}$$

$$\text{or} \quad \text{Rate} = 3.065 \cdot \text{kg} \cdot \text{day}^{-1}$$