

(13.12) A 1 GW_e nuclear power station uses annually about 30 t uranium enriched to 3% ²³⁵U. (a) How much natural uranium has been produced to keep it running? Assume waste stream from isotope separation plant to contain 0.3% ²³⁵U. (b) How much low grade ore (assume 0.06% uranium) must be mined, if the uranium recovery efficiency in the process is 70%.

$$(a): \quad m_{natU} := 30 \cdot \frac{\text{tonne}}{\text{yr}} \cdot \frac{(0.03 - 0.003)}{(0.0072 - 0.003)} \quad \text{eqn. (3.64)} \quad m_{natU} = 192.857 \cdot \frac{\text{tonne}}{\text{yr}}$$

$$(b): \quad m_{ore} := \frac{m_{natU}}{0.06 \cdot 10^{-2} \cdot 0.7} \quad m_{ore} = 4.592 \cdot 10^5 \cdot \frac{\text{tonne}}{\text{yr}}$$