

29. (a) $P_{\text{avg}} = (15 \times 10^9 \text{ W} \cdot \text{y}) / (200,000 \text{ y}) = 7.5 \times 10^4 \text{ W} = 75 \text{ kW}$.

(b) Using the result of Eq. 44-6, we obtain

$$\begin{aligned} M &= \frac{m_{\text{U}} E_{\text{total}}}{Q} \\ &= \frac{(235 \text{ u})(1.66 \times 10^{-27} \text{ kg/u})(15 \times 10^9 \text{ W} \cdot \text{y})(3.15 \times 10^7 \text{ s/y})}{(200 \text{ MeV})(1.6 \times 10^{-13} \text{ J/MeV})} \\ &= 5.8 \times 10^3 \text{ kg} . \end{aligned}$$