

(21.12) Ru, Rh, and Pd are recovered from the waste from a 10 GWe program. What will the annual amounts and specific radioactivities be at $t_{\text{cool}} = 10$ y for each of them? Data from Table 21.2.

$$Bq := \text{sec}^{-1}$$

$$P_{\text{tot}} := \frac{10 \cdot 10^9}{0.34} \cdot \text{watt}$$

$$t_{\text{irr}} := 1 \cdot \text{yr}$$

$$BUP := 33 \cdot 10^6 \cdot \text{watt} \cdot \text{day} \cdot \text{kg}^{-1}$$

$$Q_{\text{tot}} := P_{\text{tot}} \cdot t_{\text{irr}}$$

$$m_{\text{tot}} := \frac{Q_{\text{tot}}}{BUP}$$

$$m_{\text{tot}} = 3.255 \cdot 10^5 \cdot \text{kg} \quad \text{fuel.}$$

$$m_{Ru} := 4.8 \cdot \text{gm} \cdot \text{kg}^{-1}$$

$$m_{\text{tot}Ru} := m_{\text{tot}} \cdot m_{Ru}$$

$$m_{\text{tot}Ru} = 1.563 \cdot 10^3 \cdot \text{kg}$$

$$m_{Rh} := 0.53 \cdot \text{gm} \cdot \text{kg}^{-1}$$

$$m_{\text{tot}Rh} := m_{\text{tot}} \cdot m_{Rh}$$

$$m_{\text{tot}Rh} = 172.53 \cdot \text{kg}$$

$$m_{Pd} := 3.6 \cdot \text{gm} \cdot \text{kg}^{-1}$$

$$m_{\text{tot}Pd} := m_{\text{tot}} \cdot m_{Pd}$$

$$m_{\text{tot}Pd} = 1.172 \cdot 10^3 \cdot \text{kg}$$

$$S_{Ru} := \frac{5900 \cdot 10^{12}}{2.18} \cdot Bq \cdot \text{kg}^{-1}$$

$$S_{Ru} = 2.706 \cdot 10^{15} \cdot \frac{Bq}{kg}$$

$$S_{Rh} := \frac{5900 \cdot 10^{12}}{0.47} \cdot Bq \cdot \text{kg}^{-1}$$

$$S_{Rh} = 1.255 \cdot 10^{16} \cdot \frac{Bq}{kg}$$

$$S_{Pd} := \frac{0.010 \cdot 10^{12}}{1.37} \cdot Bq \cdot \text{kg}^{-1}$$

$$S_{Pd} = 7.299 \cdot 10^9 \cdot \frac{Bq}{kg}$$