

NPRE 457

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Assume a small-break LOCA with an evaporation rate \dot{e} of $0.01 \text{ m}^3/\text{sec}$ for a reactor core with a wetted area of 3 m^2 and a height of 4 m . The volume is given as:

$$V = AH = (3\text{m}^2)(4\text{m}) = 12\text{m}^3 \quad (1)$$

To find the core uncover rate, find the height per second associated with a volume loss of \dot{e} :

$$\dot{h} = \frac{\dot{e}}{A} = \frac{0.01\text{m}^3/\text{s}}{3\text{m}^2} = 0.0033\frac{\text{m}}{\text{s}} = 0.33\frac{\text{m}}{\text{s}} \quad (2)$$

Next, to find the total time for the entire core to be uncovered starting with half the core height.

$$t = \frac{h}{\dot{h}} = \frac{\frac{h}{2}}{\dot{h}} = \frac{2\text{m}}{0.0033\text{m/s}} = 600\text{s} = 10\text{min} \quad (3)$$