

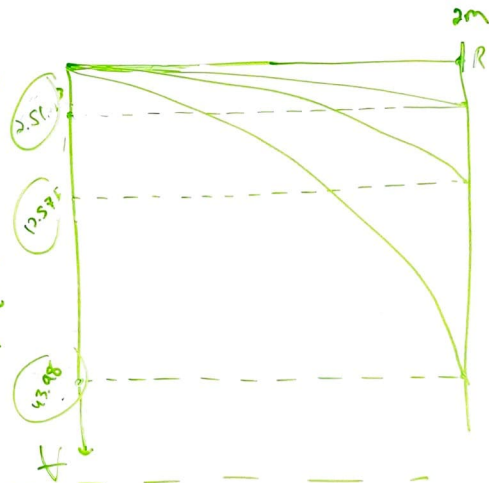
$$\frac{10,000 \text{ kg}}{365 \text{ days}} = 27.3973 \text{ kg/day}$$



$$V = \pi R^2 z$$

$$w/z = \begin{cases} 0 - .2 \text{ m}, & 0\% \text{ H}_2\text{O} \\ .2 - 1 \text{ m}, & 4\% \text{ H}_2\text{O} \\ 1 - 3.5 \text{ m}, & 10\% \text{ H}_2\text{O} \end{cases}$$

$$V = \begin{cases} 0 - .2\pi R^2 & 0\% \\ .2\pi R^2 - 1\pi R^2 & 4\% \\ 1\pi R^2 - (3.5)\pi R^2 & 10\% \end{cases}$$



* It is likely we will need 10% icy porosity, so I will jump ahead to using the full 4% IR height -

$$V = \begin{cases} .2\pi R^2 & 0 - .02 \rightarrow 0\% \\ .8\pi R^2 & .02 - .1 \rightarrow 4\% \\ (z-1)\pi R^2 & .1 - .35 \rightarrow 10\% \end{cases}$$

$$\rho_{\text{ice}} = 916.8 \text{ kg/m}^3$$

Porosity

$$\begin{array}{l} 0 - .02 \rightarrow 46.5\% \rightarrow \\ .02 - .1 \rightarrow 34.9\% \rightarrow \\ 1 - .35 \rightarrow 32.7\% \rightarrow \end{array} \left\{ \begin{array}{l} .107\pi R^2 \quad 0\% \rightarrow 0 \text{ m}^3 \text{ H}_2\text{O} \\ .5208\pi R^2 \quad 4\% \rightarrow .020832\pi R^2 \text{ m}^3 \text{ H}_2\text{O} \rightarrow 19.0988\pi R^2 \text{ kg H}_2\text{O} \\ .67(z-1)\pi R^2 \quad 10\% \rightarrow .0673(z-1)\pi R^2 \text{ m}^3 \text{ H}_2\text{O} = 61.7006(z-1)\pi R^2 \text{ kg H}_2\text{O} \end{array} \right.$$

→ assuming we do 1 trip/day, we need 27.4 kg H₂O → assuming R = .5 m

→ assuming we use z = 3.5:

$$R = .224 \text{ m}$$

$$4\% \rightarrow 15 \text{ kg}$$

$$10\% \rightarrow 48.4596z - 48.4596$$

to get 27.4 kg, z must be 1.25588

→ Drill 2.25588 m down