MCNP Training – PTNR/NDAWM/Nuc Eng January 2019

Waste Drum Exercise

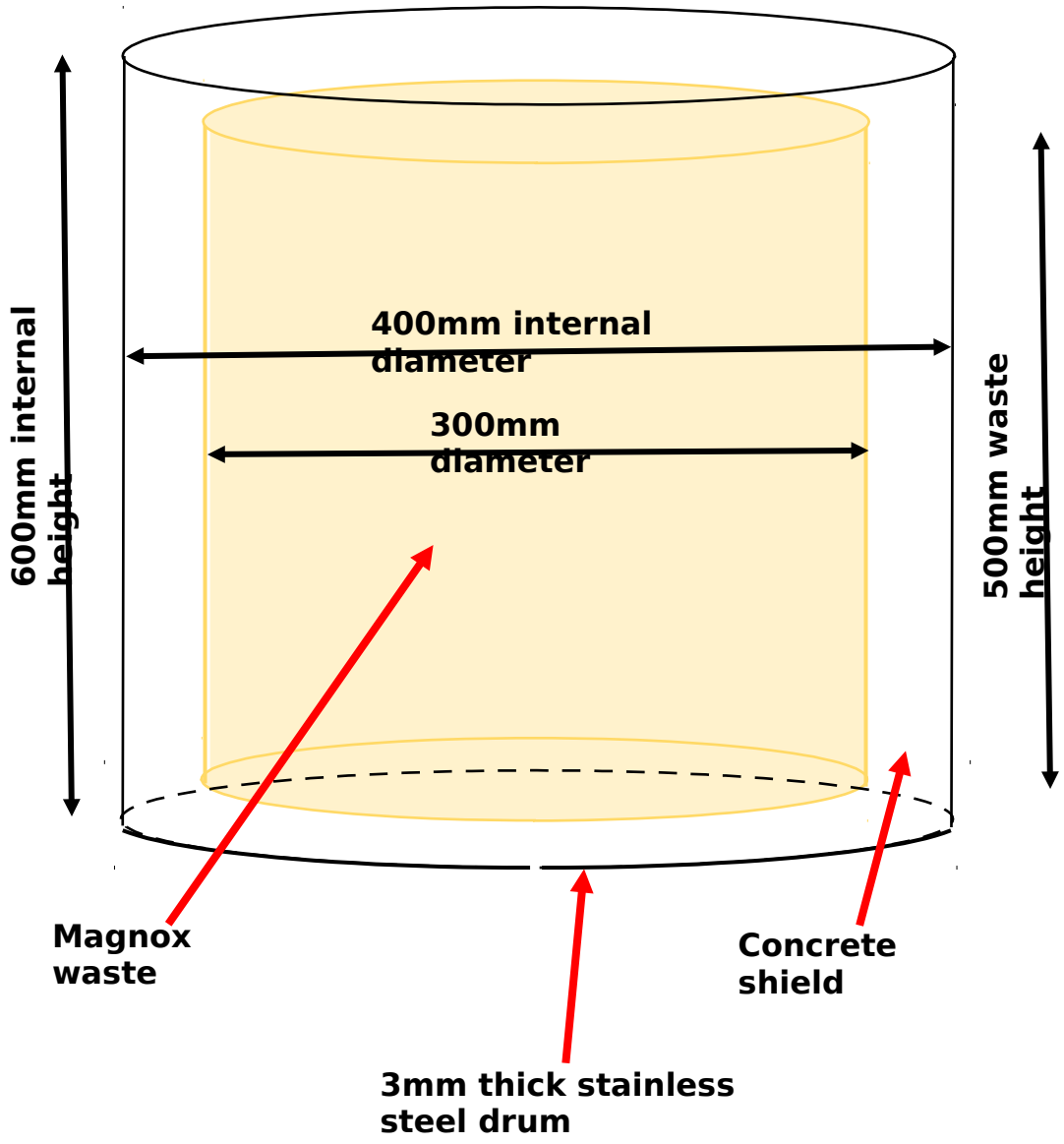
Aim: To model a simple drum of radioactive waste using MCNP

Geometry: A smeared (reduced density) volume of Magnox waste is shielded by 50mm of concrete inside a stainless steel drum. Wall, lid & base thicknesses are all 3mm. Surround the drum with air to a radius of 2m from the centre of the drum.

Calculations:

Photon flux on the surfaces of the drum and at 2m

Dose rates on the surfaces of the drum and at 2m



Materials definitions are required for:

Magnox – use magnesium of reduced density 0.87 g/cm^3

Concrete – use definition of “Ordinary Concrete” in the PNNL Compendium (PNNL-15870)

Stainless steel – use the definition for 304 stainless steel in the PNNL Compendium (PNNL-15870)

Air – use the definition for dry air “near sea level” in the PNNL Compendium (PNNL-15870)

Sources: Various, but start with ^{60}Co

Tally photon surface fluxes averaged over:

a. The lid of the drum
b. The base of the drum
c. Combined over both lid and base of drum
d. The wall of the drum
e. At a distance of 2m

Tally dose rates over the same surfaces. Use ICRP-21 photon flux-to-dose conversion factors in Table H.2 of Appendix H of the MCNP manual.