Project: PS-TGT-14-002 Bubble Chamber

Tittle: General calculations for occupational exposure

Document Number: TGT-CALC-502-002

Revision: Original

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Description:
General calculations for occupational exposure

Reference Drawing(s):

Units specific to this calculation

$$ppm := \frac{1}{10^6}$$

Dimensions of Injector Area

$L_{inj} := 100 \cdot ft$ length of injector tunnel stopping at fence

$W_{inj} := 21. \cdot ft$ width of injector tunnel

$H_{inj} := 11.25 \cdot ft$ height of inector tunnel

$V_{inj} := L_{inj} \cdot W_{inj} \cdot H_{inj} = \left(6.69 \cdot 10^{5}\right)\ L$

The occupational exposure limits for both fluids are

$lim_{N2O} := 50 \cdot ppm$ listed occ exposure limit for N2O

$lim_{C2F6} := 1000 \cdot ppm$ listed occ exposure limit for C2F6

$Va_{N2O} := lim_{N2O} \cdot V_{inj} = 33.449\ L$ max quant limit for N2O at STP

$Va_{C2F6} := lim_{C2F6} \cdot V_{inj} = 668.986\ L$ max quant limit for C2F6 at STP

The N2O stored in the small glass vessel would occupy 17 liters at STP. This is about 1/2 of the estimated allowable for the injector area. This is conservative in that the area is considered to stop at the fence to the linac. The C2F6 estimate is much more conservative. Upon completion of the chamber fill cycle the the supply bottle shall be valved off.