

File with back-up  
Documents

①

Mason + Hanger - Silas Mason Co., Inc.  
14-24479-01 (Facility Calculations)

Location ①:

Distance source to outer ring = 1.82 Meters = 5.9 ft

Concrete shield = 50.8 cm = 1.7 ft.

Lead shield = .58 ft.

Co-60 = 14000 R/hr/1000 ci at 1ft

$$I = I_0 \times e^{-\mu x}$$

$$I = 14000 \times e^{-\frac{.693}{.041} (.58)}$$

$$(5.9)^2$$

I = 22 mR/hr. with Lead shield only at outside ring.

$$I = 22 \times e^{-\mu x}$$

$$I = 22 \times e^{-\frac{.693}{.12} (1.7ft)}$$

$$(5.9)^2$$

I = .002 mR/hr - Location 1 ✓OK

Location ④:

Distance source to outside shield = 10.5 ft

Concrete shield = 96.5 cm = 38" = 3.2 ft

Lead shield =

Cobalt-60 = 14000 R/hr/1000 ci at 1ft

B-1

(over)

$$I = \frac{I_0 \times e^{-\frac{.1693}{.12}(3.2)}}{(10.5')^2}$$

$$I = \frac{14000 \times e^{-\frac{.1693}{.12}(3.2)}}{(10.5')^2}$$

$$I = 2 \text{ mR/hr} = \text{Location } \textcircled{4}$$

Bldg. 3A -05-2 Location ①

Distance to outside shield = 12 ft

Concrete = 4 ft

Cobalt-60 = 14000 R/hr (1000 Ci) at 1 ft  
attenuation for Concrete = .2

$$I = \frac{14000 \times e^{-\frac{.1693}{.12}(4')}}{(12)^2}$$

$$I = .0001 \text{ R/hr} = .1 \text{ mR/hr} \checkmark \text{OK}$$

(2)

Bldg. 3A-100

Location ①

Distance source to outside shield = 7.9 ft

Concrete shield = 66 cm = 2.2 ft

Pb shield = 10.16 cm = .33 ft

Co-60 = 14000 R/hr/1000 Ci/ft

Cobalt-60 = .2 ft attenuation Pb attenuation = .041 ft

$$I = \frac{14000 \times e^{-\frac{.693}{.12} (2.2)}}{(7.9)^2}$$

I = .11 R/hr through concrete or 110 mR/hr

$$= \frac{110 \text{ mR/hr} \times e^{-\frac{.693}{.041} (.33)}}{(7.9)^2}$$

$$= 1.007 \text{ mR/hr} \quad \text{OK}$$

Location ③

distance to outside shield = 26.3 ft

Pb shield = 1 ft

attenuation = .041 ft

$$I = \frac{14000 \times e^{-\frac{.693}{.041} (1 \text{ ft})}}{(26.3)^2}$$

$$I = .0009 \text{ mR/hr} \quad \text{OK}$$