



OPTIMIZATION OF A BUNKER FOR GAMAGRAPHY OF PIPES WITH A DIAMETER OF 2m

Sahyun, Adelia^{1,2,5}; Sordi, Gian-Maria^{1,2}; Ghobril, Carlos N.^{1,3}; Perez, Clarice F.A.⁴;
Ribeiro, Kenia A.M.F⁵

¹ATOMO – Radioproteção e Segurança Nuclear S/S Ltda, São Paulo, SP, Brasil
adelia@atomo.com.br

²Instituto de Pesquisas Energéticas e Nucleares – IPEN-CNEN/SP, São Paulo, SP, Brasil

³Instituto de Economia Agrícola - Governo de São Paulo – IEA, São Paulo, SP, Brasil

⁴Centro Tecnológico da Marinha em São Paulo, - CTMSP, São Paulo, SP, Brasil

⁵ Associação Brasileira de Ensaio Não Destrutivos e Inspeção – ABENDI, São Paulo, SP, Brasil

DATA

Irradiated Material: Pipes with a diameter up to 2 m, and up to, 6 m length

Source: 2.22×10^{12} Bq (60 Ci) of ^{192}Ir

Pipes, material thickness: 1 to 4.4 cm of iron

Supervised Area: of up to 1 m distance

Non Designated Area: up to 1 m from the bunker

OPTIONS

- that the pipes can enter into the bunker from the front;
- from behind, by means of a rail road car;
- from the ceiling, using a crane;
- from the ceiling sliding over the rail road, in this case the pipe would enter from the front or from behind the bunker;
- the pipe could enter by the lateral with a removable sliding wall

CALCULATION

It was used the computer code “MEGA SHIELD VERSION 3.0”

RESULT

**Thickness and External Dose for
Walls and Gate**

Wall and Gate	Material	Thickness (cm)	Dose (mR/h)
A, B, C	Concrete	80.0	4.13×10^{-2}
D(Gate)	Concrete	80.0	4.13×10^{-2}

Thickness and Dose for Ceiling

Ceiling		
Material	Thickness (cm)	Dose (mR/h)
Concrete	28.0	5.00×10^{-2}

Floor: Do not need shielding

BEST OPTIONS

(a) and (b) at a cost of US\$ 120,000.00