

Scan Technologies, Inc.

*P.O. Box 519
Grayson, GA 30017
770-338-2868*

July 10, 2015

Mr. Celimar Valentin-Rodriguez
U.S. Nuclear Regulatory Commission
Materials Safety & Inspection Branch
Division of Industrial & Medical Nuclear Safety
Two White Flint North
11545 Rockville Pike
North Bethesda, MD 20852-2738

RE: SS&D Certificate NR-0716-D-110-S Amendment

Dear Mr. Valentin-Rodriguez,

This letter is in response to your questions dated June 12, 2015, regarding our amendment to add a new sealed source model to Registration Certificate NR-0716-D-110-S.

If you need any additional information, please let me know.

Sincerely,


Jack Ramsey, PE
Radiation Safety Officer



Scantech International Pty Ltd.
143 Mooringe Ave
Camden Park, South Australia, 5038
Australia



1. Please state whether any modifications will be made to the Analyzer-5 and Analyzer-6 devices in order to use the Eckert & Ziegler Isotope Product source model Cf2.N02.

No modifications will be made to the Analyzer-5 and Analyzer-6 devices in order to use the Eckert & Ziegler Isotope Product source model Cf2.N02.

2. Please confirm that the Cf2.N02 sources will not exceed the maximum activity of 50 μg (26.8 mCi) of Cf-252 that is currently stated in the device registration certificate.

The Cf2.N02 sources will not exceed the maximum nominal activity of 50 μg (26.8 mCi) that is currently stated in the device registration certificate. However, the manufacturer states that there is the potential for a +15% actual activity tolerance. Therefore, the actual source activity could be as high as 57.5 μg , or 30.8 mCi and still be sold as a 50 μg source. Typically, there would be a 2-3 month delay between manufacture and installation, so the source would be decayed to approximately 54 μg , but we will proceed under the assumption that the source could arrive and be installed at the maximum 57.5 μg activity level.

For this case and all situations where the actual source activity might be larger than the nominal activity of the source, we are submitting a new set of radiation profiles showing the radiation levels around the gauge based on a maximum activity level of 57.5 μg . We have prepared these radiation patterns for the Analyzer-5, Analyzer-6, and the storage drum.

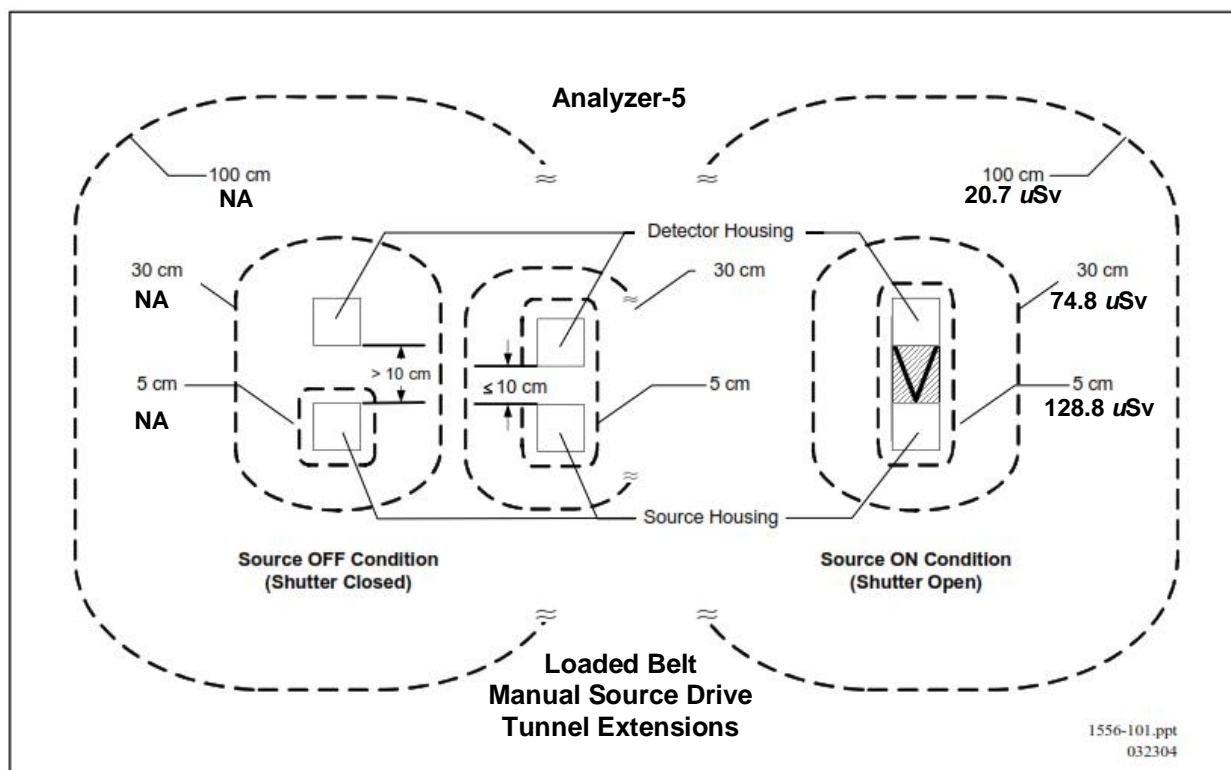
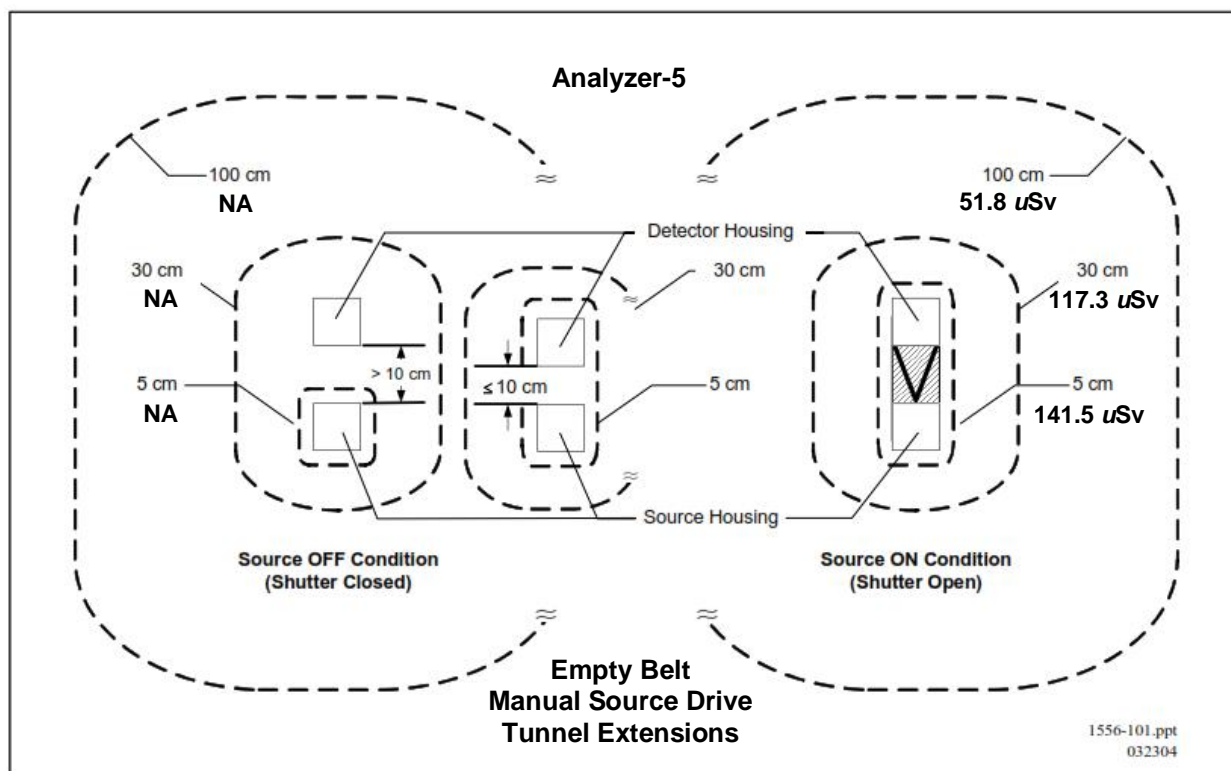
3. Please discuss whether there are any changes to the radiation profiles (external radiation levels) for the Analyzer-5 and Analyzer-6 device models, based on the Cf2.N02 source model. Also, if the source is expected to contain a maximum activity of 57.5 μg of Cf-252 at any time, please provide the radiation profiles.

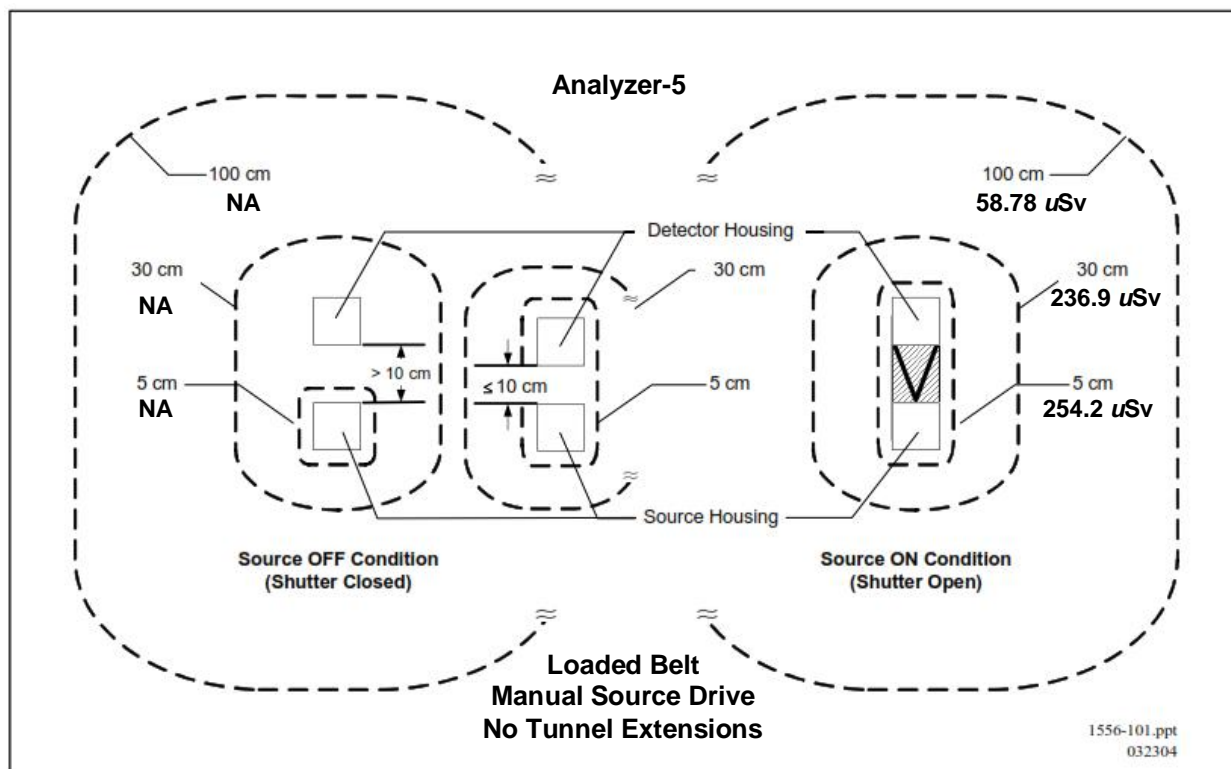
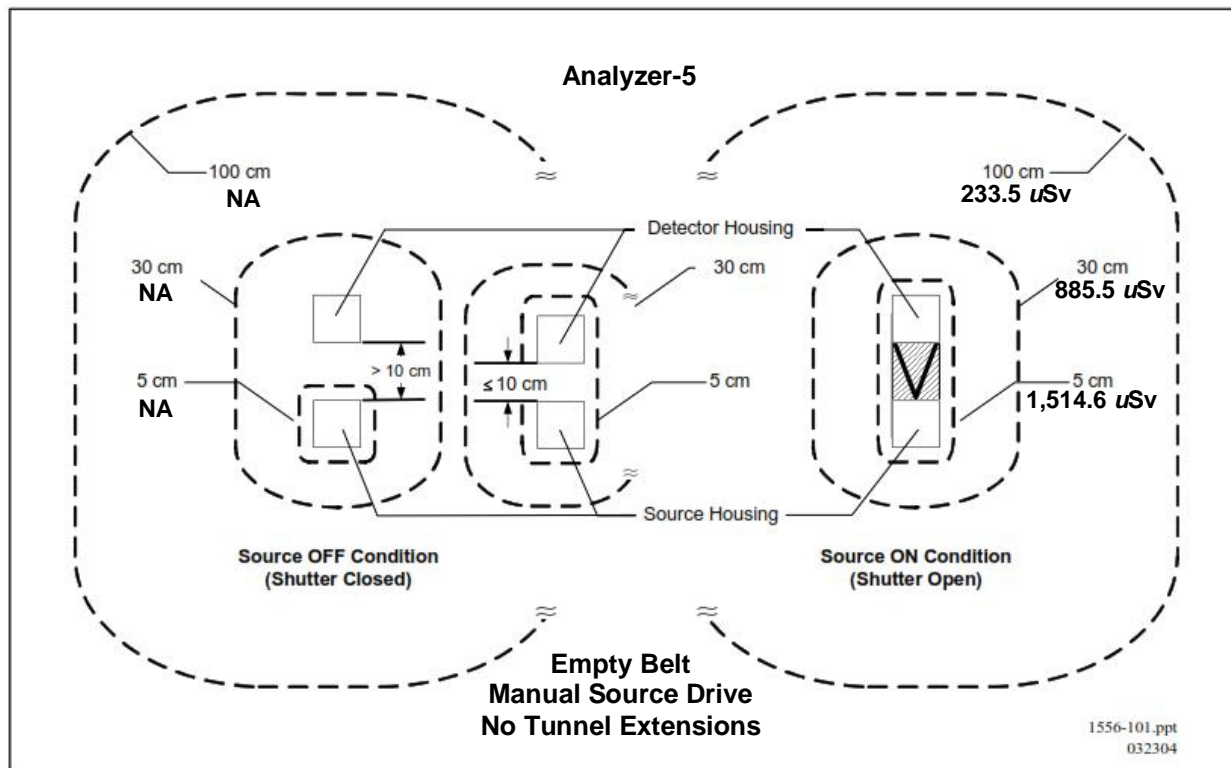
There should not be any changes to the radiation profiles based on the use of the Cf2.N02 source model versus the originally licensed sources. The source will be installed into the same source holder and source rod as the original sources and will have a similar radiation profile. The only significant difference would be the intensity of the dose profiles due to higher or lower actual source activities.

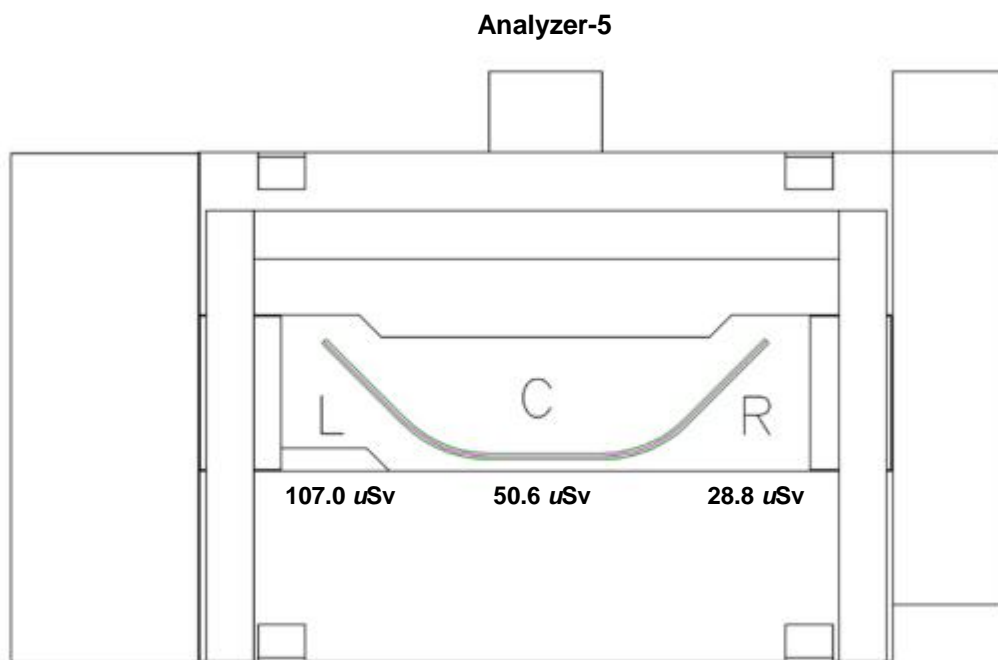
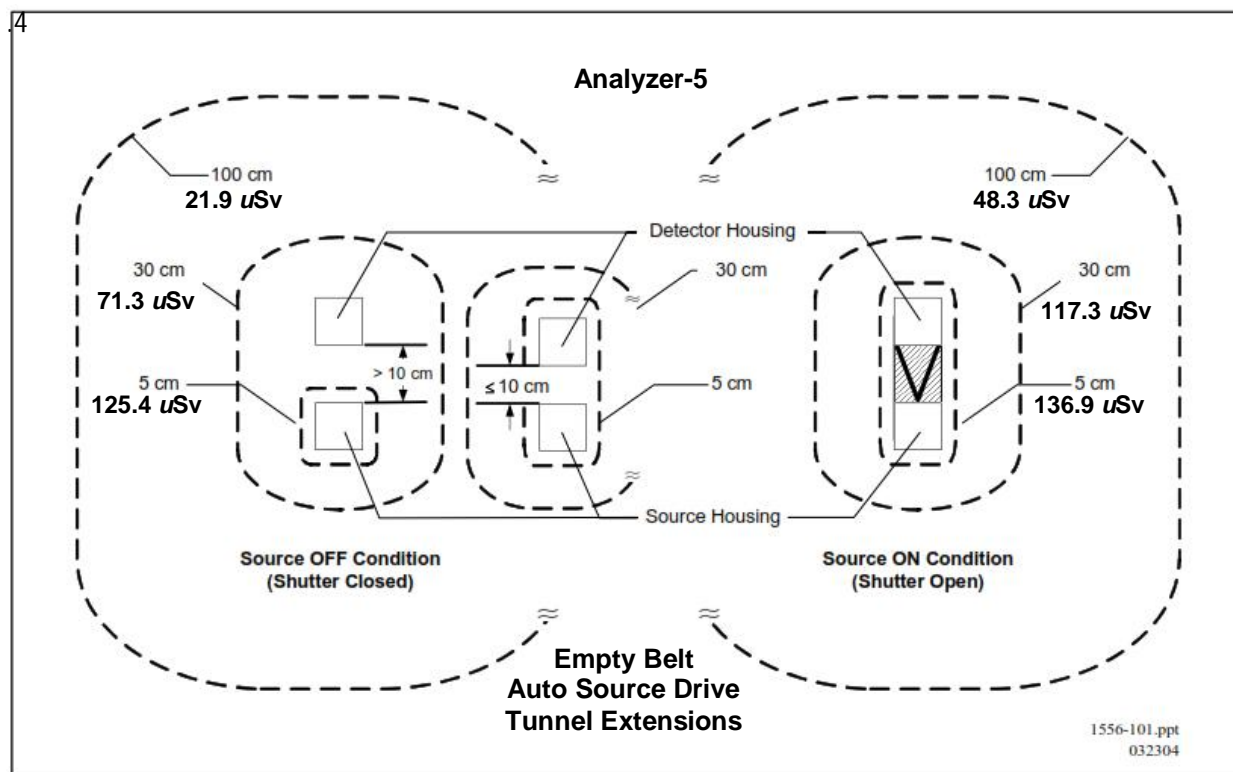
The following radiation profiles represent the maximum radiation levels around the Analyzer using a nominal 50 μg Cf-252 source that has a +15% tolerance, or an actual activity of 57.5 μg . The radiation measurements can be found in the attachments.

Analyzer-5

- a. Empty Belt, Manual Source Drive, Tunnel Extensions, Beam ON & Beam OFF
- b. Loaded Belt, Manual Source Drive, Tunnel Extensions, Beam ON & Beam OFF
- c. Empty Belt, Manual Source Drive, No Tunnel Extensions, Beam ON & Beam OFF
- d. Loaded Belt, Manual Source Drive, No Tunnel Extensions, Beam ON & Beam OFF
- e. Empty Belt, Auto Source Drive, Tunnel Extensions, Beam ON & Beam OFF
- f. Empty Belt, Auto Source Drive, Inside Tunnel Extensions at the Idlers, Beam OFF



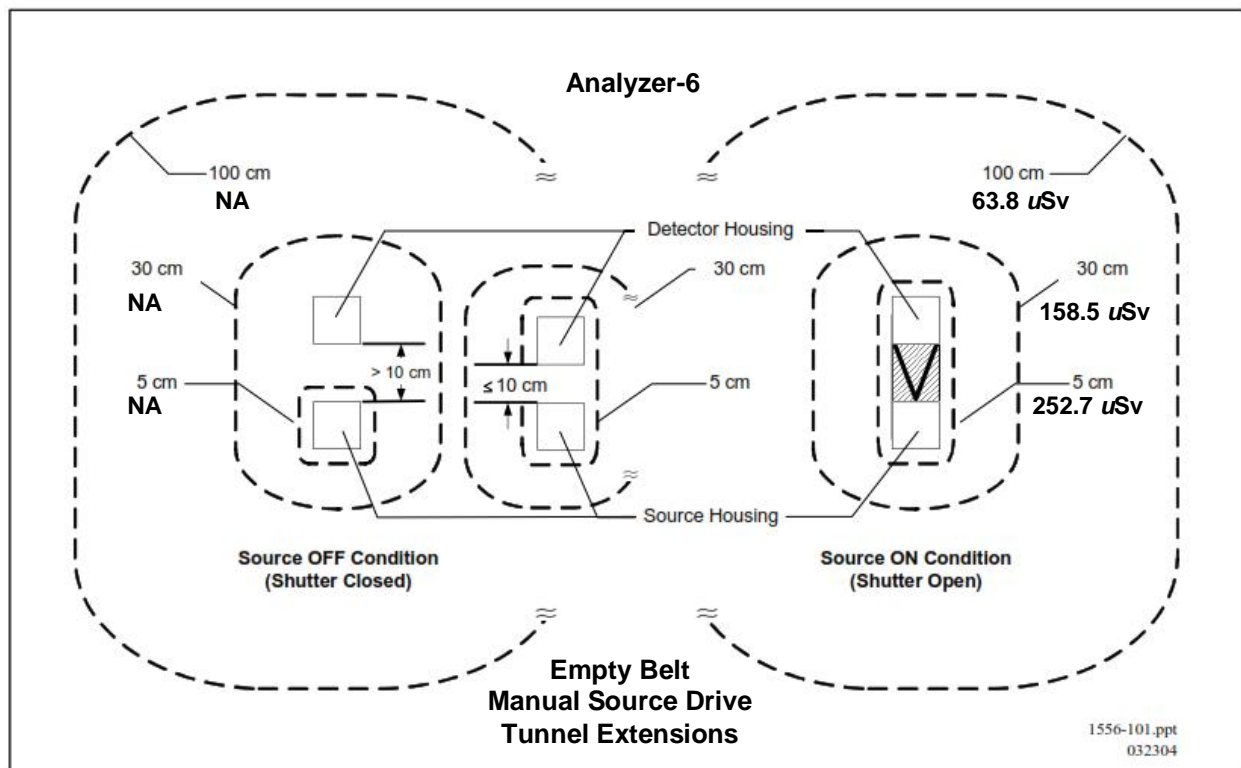


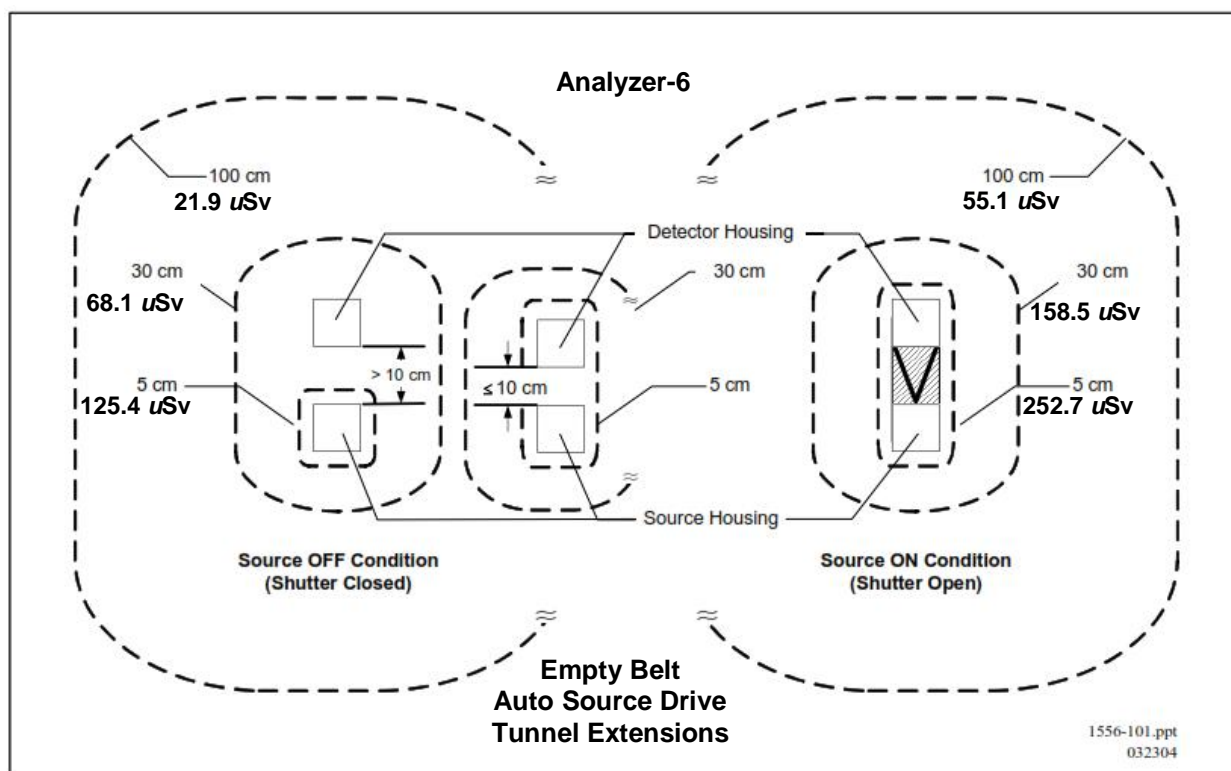
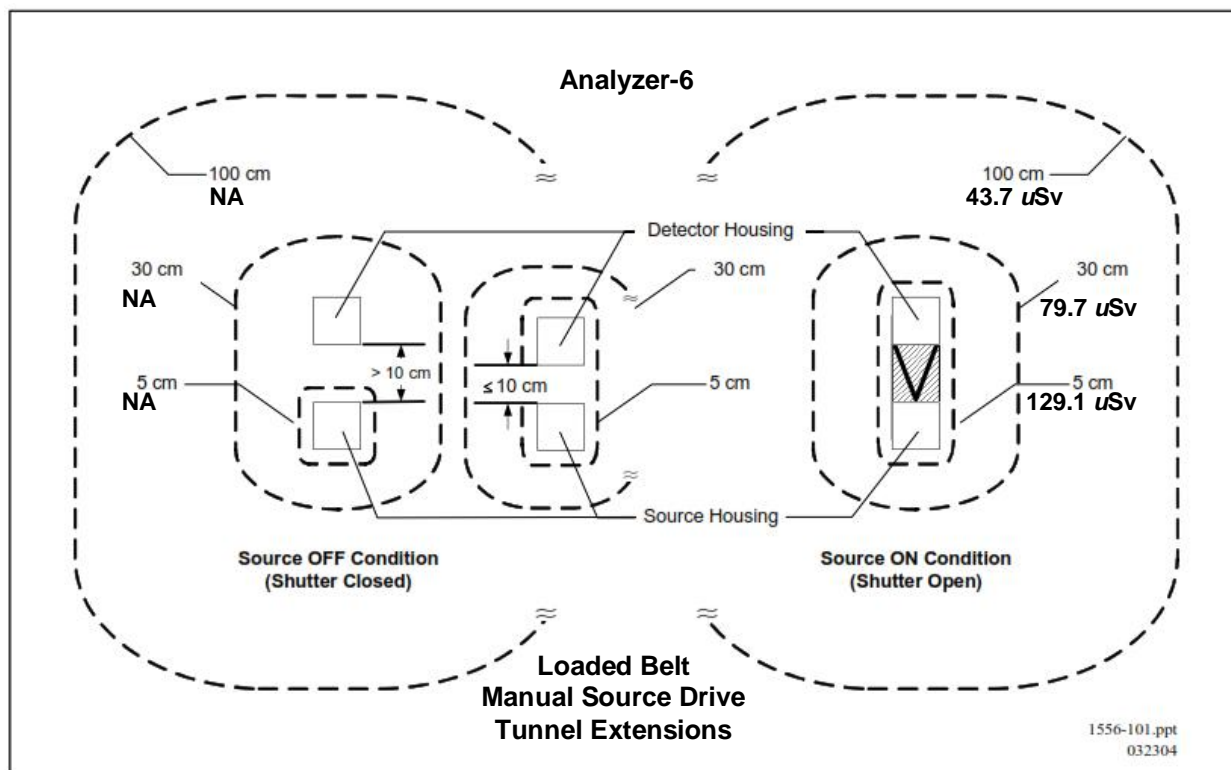


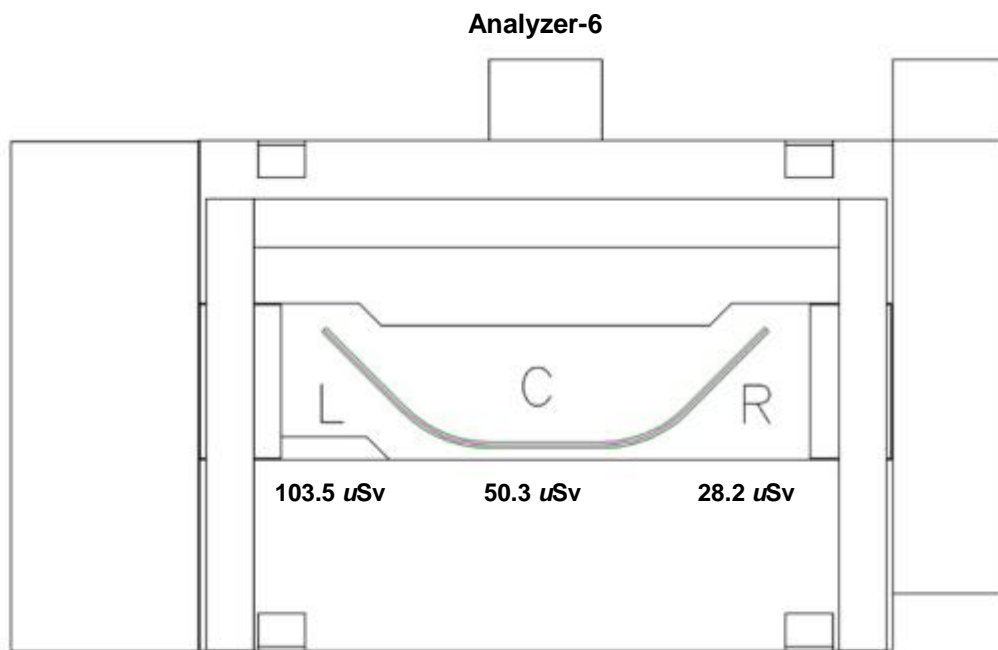
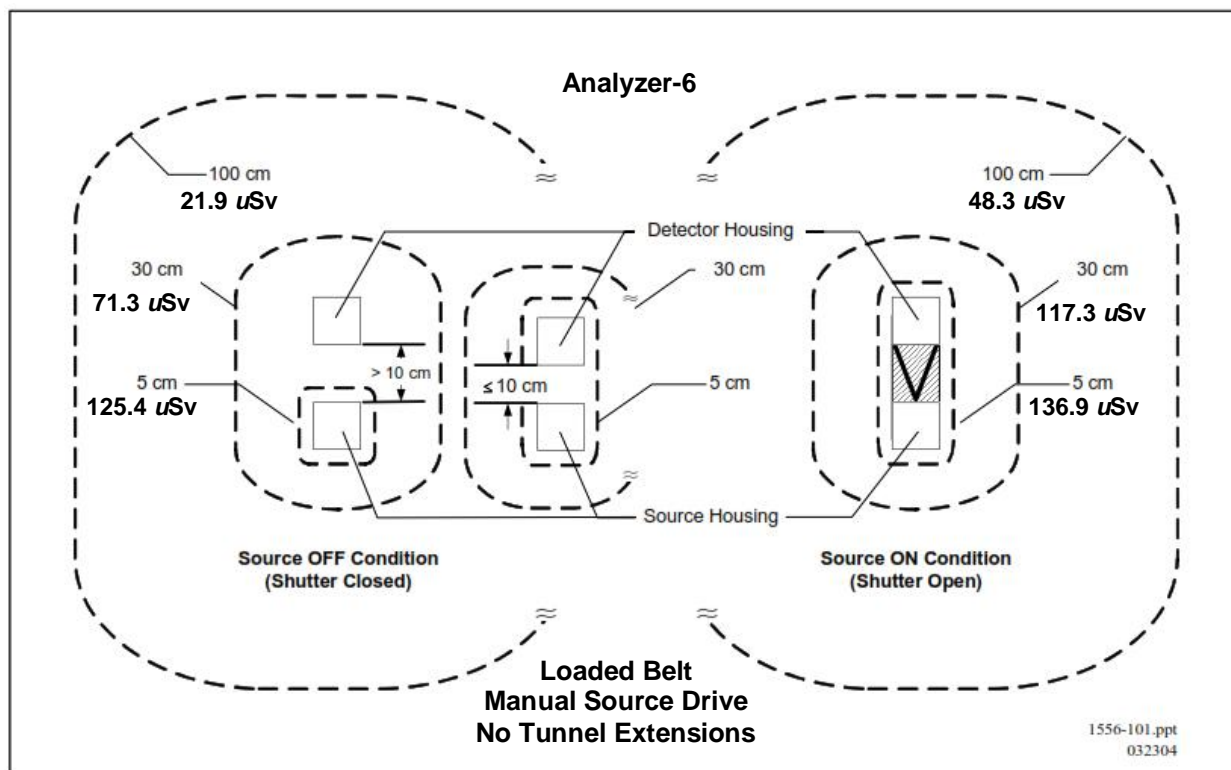
**Empty Belt
Auto Source Drive
At Idlers
Beam OFF**

Analyzer-6

- a. Empty Belt, Manual Source Drive, Tunnel Extensions, Beam ON & Beam OFF
- b. Loaded Belt, Manual Source Drive, Tunnel Extensions, Beam ON & Beam OFF
- c. Empty Belt, Manual Source Drive, No Tunnel Extensions, Beam ON & Beam OFF
- d. Loaded Belt, Manual Source Drive, No Tunnel Extensions, Beam ON & Beam OFF
- e. Empty Belt, Auto Source Drive, Tunnel Extensions, Beam ON & Beam OFF
- f. Empty Belt, Auto Source Drive, Inside Tunnel Extensions at the Idlers, Beam OFF







Attachment I

Radiation Profiles
Analyzer-5

7. Radiation Dose Rates

An On Belt Analyser-5 radiation survey was conducted from 17th March to 24th March 2005. Instruments used were:

- A. Neutron Meter: Model 12-4 neutron dose meter
S/N 192476
Manufactured by Ludlum Measurements Inc.
Sweetwater Texas USA
Calibrated by Ludlum to ANSI/NCSL Z540-1-1994 and
ANSI N323-1978 standard on 27th February 2005
- B. Gamma Meter: Model 9 ionisation chamber gamma dose meter
S/N 183526
Manufactured by Ludlum Measurements Inc.
Sweetwater Texas USA
Calibrated by Ludlum to ANSI/NCSL Z540-1-1994 and
ANSI N323-1978 standard on 27th February 2005

At the time of the On Belt Analyser-5 survey, the Californium sources that were used had a total activity of 1.02 GBq (51.7 micrograms).

At the time of the Source Storage drum survey in May 2002, different Californium sources were used and had a total activity of 1.4 GBq (71.4 micrograms).

All measured dose rates have been scaled for a 57.5ug Californium source.

Dose Rate Measurements External to the Analyser

Dose rates were measured on all accessible surfaces of the analyser.

Gamma measurements were made at distances of 5cm, 30cm and 100cm from the surface of the analyser.

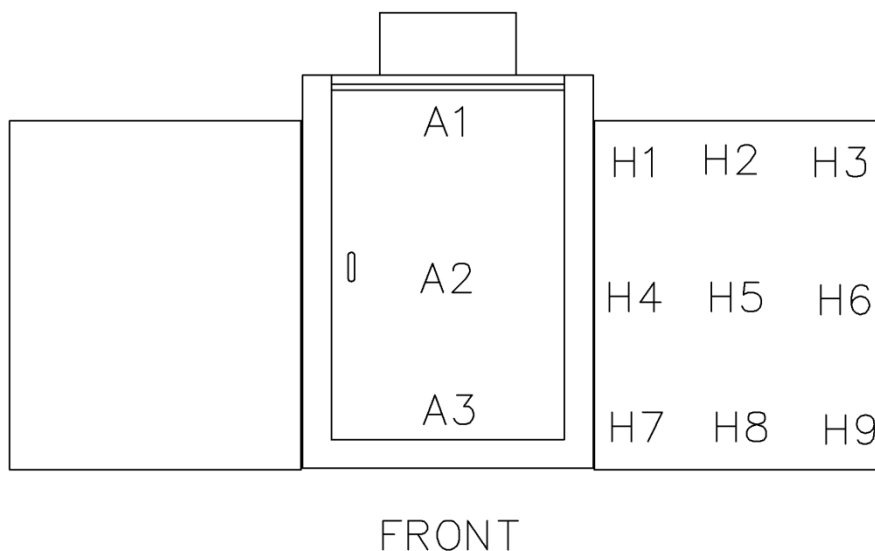
The neutron dosimeter consists of a neutron counter tube inside a polyethylene sphere 230 mm in diameter. The 5cm neutron measurements were made with the sphere in contact the surface of the analyser. Measurements were also made with the centre of the sphere at 30cm and 100cm from the surface of the analyser.

The following measurements were taken:

1. On Belt Analyser-5, Belt empty.
2. On Belt Analyser-5, Belt loaded with a typical 200mm depth of crushed material.
3. Source storage drum

This is the condition of the source storage drum when source rod is stored in the central tube of the drum. The outer rod is unscrewed and stored inside the analyser's electronics cabinet.

NOTE: The reference points illustrated on the drawings indicate the point where the measurements are made at the surface of the analyser. Measurements are made at 5cm, 30cm and 100cm adjacent to and on a level plane from that reference point.

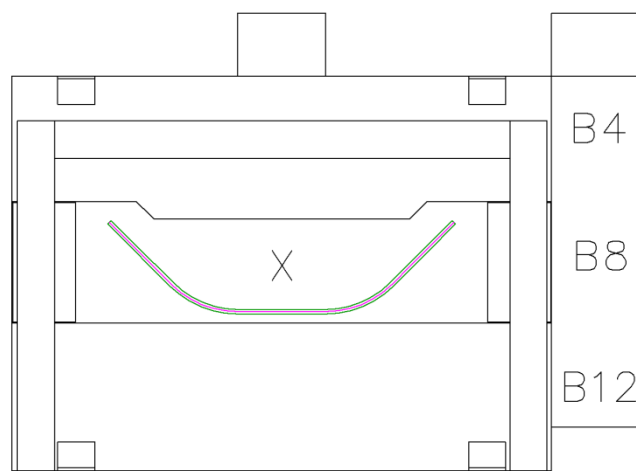


BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
A1	2.3	6.9	9.2	2.3	5.8	8.1	1.2	4.6	4.6
A2	4.6	6.9	10.4	2.3	4.6	6.9	2.3	3.5	5.8
A3	2.3	4.6	6.9	2.3	4.6	6.9	2.3	4.6	6.9
H1	10.4	26.5	36.8	9.2	12.7	21.9	2.3	3.5	5.8
H2	8.1	10.4	18.4	5.8	10.4	16.1	2.3	4.6	6.9
H3	5.8	9.2	15	4.6	8.1	12.7	1.2	3.5	4.6
H4	11.5	12.7	24.2	8.1	8.1	16.1	3.5	4.6	8.1
H5	6.9	4.6	11.5	5.8	6.9	12.7	2.3	4.6	6.9
H6	5.8	4.6	10.4	4.6	5.8	10.4	2.3	3.5	5.8
H7	8.1	10.4	18.4	5.8	8.1	13.8	4.6	5.8	10.4
H8	8.1	9.2	17.3	5.8	5.8	11.5	4.6	4.6	9.2
H9	5.8	6.9	12.7	4.6	4.6	9.2	3.5	4.6	8.1

BEAM ON Loaded belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
A1	3.5	3.5	5.8	2.3	2.3	4.6	1.2	2.3	3.5
A2	4.6	2.3	6.9	4.6	3.5	6.9	1.2	2.3	3.5
A3	3.5	2.3	5.8	2.3	2.3	4.6	1.2	2.3	3.5
H1	8.1	9.2	17.3	3.5	5.8	9.2	1.2	3.5	4.6
H2	3.5	4.6	8.1	2.3	5.8	8.1	1.2	3.5	4.6
H3	3.5	3.5	6.9	2.3	4.6	6.9	1.2	2.3	3.5
H4	11.5	9.2	20.7	4.6	6.9	11.5	1.2	4.6	5.8
H5	5.8	2.3	8.1	3.5	5.8	9.2	1.2	4.6	5.8
H6	4.6	2.3	6.9	3.5	4.6	8.1	1.2	2.3	3.5
H7	9.2	9.2	18.4	3.5	4.6	8.1	1.2	2.3	3.5
H8	6.9	5.8	12.7	3.5	3.5	6.9	1.2	2.3	3.5
H9	4.6	3.5	8.1	2.3	3.5	5.8	1.2	2.3	3.5



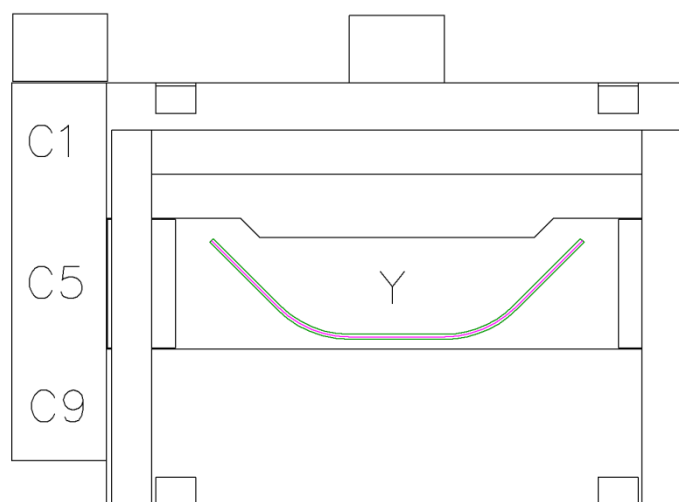
LEFT SIDE

BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
B4	6.9	8.1	15	8.1	10.4	18.4	5.8	9.2	15
B8	4.6	12.7	17.3	6.9	4.6	11.5	5.8	4.6	10.4
B12	4.6	9.2	13.8	8.1	9.2	17.3	5.8	6.9	12.7
X	18.4	123.1	141.5	17.3	82.8	100.1	11.5	40.3	51.8

BEAM ON Loaded belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
B4	5.8	5.8	11.5	5.8	8.1	13.8	2.3	17.3	19.6
B8	6.9	8.1	15	4.6	9.2	13.8	2.3	20.7	23
B12	3.5	6.9	10.4	2.3	8.1	10.4	1.2	9.2	10.4
X	11.5	26.5	38	12.7	18.4	31.1	2.3	5.8	8.1



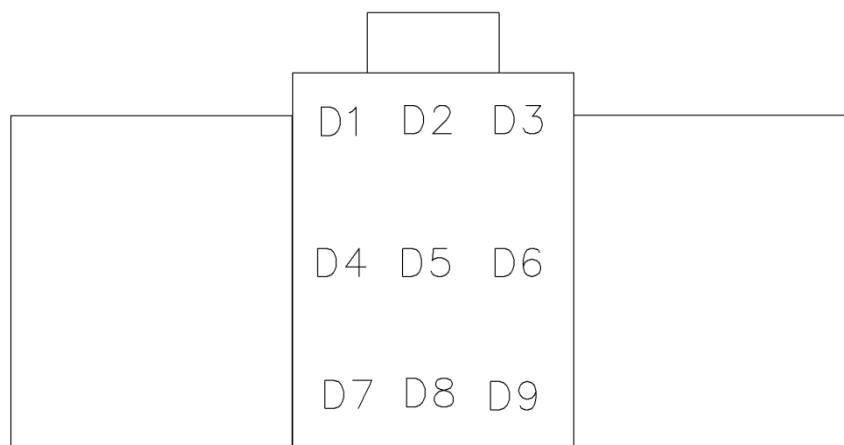
RIGHT SIDE

BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
C1	5.8	8.1	13.8	8.1	10.4	18.4	5.8	9.2	15
C5	4.6	11.5	16.1	6.9	4.6	11.5	5.8	4.6	10.4
C9	4.6	8.1	12.7	8.1	9.2	17.3	5.8	6.9	12.7
Y	17.3	118.5	135.7	16.1	84	100.1	12.7	38	50.6

BEAM ON Loaded belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
C1	5.8	6.9	12.7	8.1	10.4	18.4	5.8	8.1	13.8
C5	4.6	11.5	16.1	6.9	4.6	11.5	5.8	5.8	11.5
C9	4.6	8.1	12.7	8.1	9.2	17.3	5.8	6.9	12.7
Y	12.7	24.2	36.8	11.5	20.7	32.2	2.3	5.8	8.1



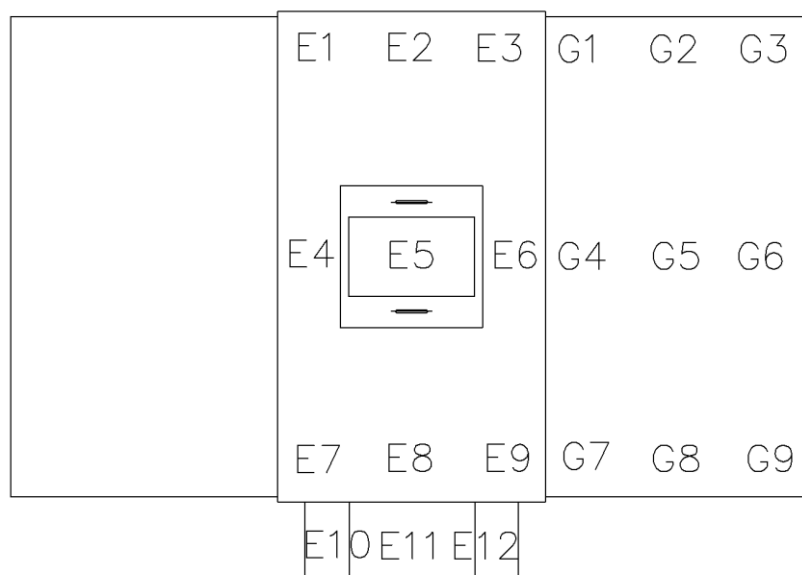
REAR

BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
D1	2.3	8.1	11.5	3.5	8.1	10.4	2.3	4.6	6.9
D2	3.5	9.2	11.5	3.5	10.4	12.7	2.3	3.5	5.8
D3	2.3	9.2	11.5	3.5	8.1	10.4	2.3	6.9	8.1
D4	5.8	10.4	16.1	4.6	10.4	13.8	2.3	4.6	6.9
D5	8.1	15	21.9	4.6	9.2	13.8	2.3	5.8	8.1
D6	5.8	11.5	16.1	3.5	6.9	10.4	2.3	5.8	8.1
D7	2.3	4.6	5.8	2.3	4.6	5.8	2.3	4.6	5.8
D8	2.3	3.5	5.8	3.5	4.6	8.1	2.3	3.5	4.6
D9	2.3	3.5	4.6	2.3	4.6	6.9	2.3	3.5	5.8

BEAM ON Loaded belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
D1	6.9	5.8	11.5	6.9	3.5	10.4	2.3	3.5	5.8
D2	8.1	6.9	15	8.1	4.6	12.7	3.5	3.5	6.9
D3	6.9	6.9	13.8	6.9	4.6	11.5	2.3	3.5	5.8
D4	11.5	8.1	19.6	8.1	5.8	13.8	3.5	2.3	5.8
D5	13.8	10.4	24.2	9.2	4.6	12.7	4.6	3.5	8.1
D6	12.7	11.5	24.2	9.2	4.6	13.8	3.5	2.3	5.8
D7	6.9	3.5	10.4	6.9	2.3	9.2	3.5	1.2	4.6
D8	8.1	3.5	11.5	6.9	2.3	9.2	3.5	1.2	4.6
D9	5.8	4.6	10.4	5.8	3.5	9.2	2.3	2.3	4.6

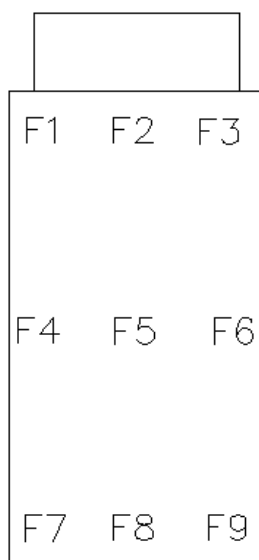


BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
E1	10.4	75.9	86.3	9.2	94.3	103.5	3.5	40.3	43.7
E2	23	113.9	136.9	11.5	105.8	117.3	5.8	35.7	41.4
E3	10.4	74.8	85.1	9.2	96.6	105.8	4.6	42.6	46
E4	9.2	51.8	61	8.1	52.9	61	4.6	27.6	32.2
E5	9.2	75.9	85.1	5.8	51.8	57.5	4.6	16.1	20.7
E6	9.2	50.6	59.8	9.2	55.2	64.4	4.6	25.3	29.9
E7	9.2	74.8	84	8.1	98.9	107	4.6	43.7	47.2
E8	24.2	112.7	136.9	11.5	103.5	115	5.8	33.4	39.1
E9	10.4	75.9	86.3	10.4	97.8	108.1	3.5	44.9	48.3
E10	2.3	6.9	9.2	1.2	3.5	4.6	2.3	6.9	9.2
E11	2.3	8.1	10.4	2.3	6.9	9.2	2.3	9.2	11.5
E12	2.3	8.1	10.4	1.2	3.5	4.6	2.3	8.1	10.4
G1	4.6	8.1	12.7	2.3	8.1	10.4	2.3	12.7	15
G2	4.6	13.8	18.4	3.5	9.2	12.7	2.3	6.9	9.2
G3	4.6	10.4	15	3.5	6.9	10.4	1.2	4.6	5.8
G4	12.7	23	35.7	5.8	23	28.8	2.3	25.3	27.6
G5	11.5	28.8	40.3	8.1	17.3	25.3	3.5	13.8	17.3
G6	5.8	10.4	16.1	4.6	13.8	18.4	1.2	10.4	11.5
G7	5.8	8.1	13.8	2.3	9.2	11.5	2.3	11.5	13.8
G8	5.8	12.7	18.4	3.5	11.5	15	1.2	6.9	8.1
G9	3.5	10.4	13.8	3.5	5.8	9.2	2.3	4.6	6.9

BEAM ON Loaded belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
E1	12.7	26.5	39.1	9.2	27.6	36.8	3.5	11.5	15
E2	13.8	29.9	43.7	11.5	32.2	43.7	3.5	11.5	15
E3	12.7	25.3	38	9.2	27.6	36.8	3.5	10.4	13.8
E4	12.7	15	26.5	9.2	23	32.2	3.5	11.5	15
E5	8.1	24.2	32.2	6.9	18.4	25.3	3.5	9.2	12.7
E6	11.5	13.8	25.3	9.2	25.3	34.5	3.5	10.4	13.8
E7	13.8	25.3	39.1	9.2	26.5	35.7	3.5	10.4	12.7
E8	15	31.1	46	10.4	31.1	41.4	3.5	10.4	12.7
E9	12.7	26.5	39.1	9.2	27.6	36.8	3.5	10.4	13.8
E10	2.3	2.3	4.6	2.3	1.2	3.5	2.3	0	2.3
E11	2.3	2.3	4.6	2.3	1.2	2.3	2.3	0	2.3
E12	2.3	2.3	4.6	2.3	1.2	3.5	2.3	0	2.3
G1	5.8	3.5	9.2	3.5	4.6	8.1	1.2	2.3	3.5
G2	3.5	2.3	5.8	3.5	3.5	6.9	3.5	3.5	6.9
G3	3.5	2.3	5.8	2.3	2.3	4.6	2.3	3.5	5.8
G4	10.4	6.9	17.3	3.5	6.9	10.4	2.3	5.8	8.1
G5	8.1	4.6	12.7	5.8	5.8	11.5	2.3	3.5	5.8
G6	3.5	3.5	6.9	3.5	5.8	9.2	2.3	3.5	5.8
G7	5.8	2.3	8.1	3.5	3.5	6.9	1.2	1.2	2.3
G8	3.5	1.2	4.6	2.3	3.5	5.8	2.3	3.5	5.8
G9	2.3	2.3	4.6	2.3	3.5	5.8	2.3	2.3	4.6



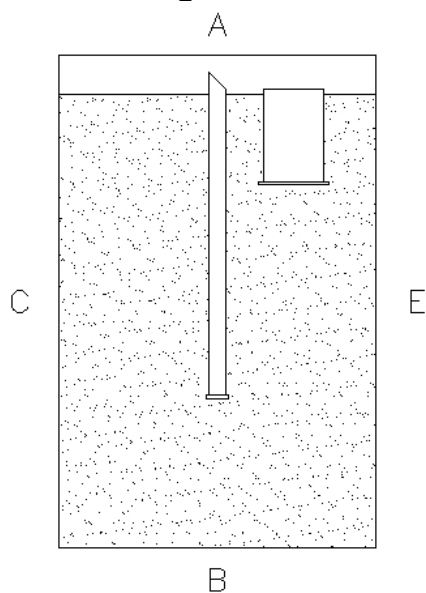
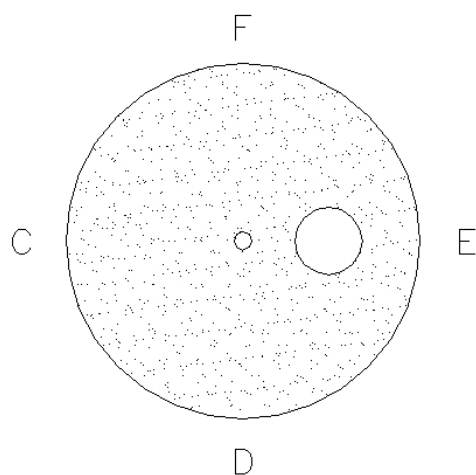
BOTTOM

BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
F1	3.5	10.4	13.8	5.8	10.4	16.1	5.8	12.7	18.4
F2	8.1	10.4	18.4	8.1	16.1	24.2	4.6	11.5	16.1
F3	4.6	10.4	15	4.6	9.2	13.8	4.6	12.7	17.3
F4	19.6	39.1	58.7	16.1	32.2	48.3	6.9	13.8	20.7
F5	41.4	87.4	128.8	25.3	48.3	73.6	6.9	15	21.9
F6	20.7	40.3	61	15	29.9	44.9	5.8	13.8	19.6
F7	3.5	9.2	12.7	5.8	9.2	15	5.8	13.8	19.6
F8	9.2	10.4	19.6	6.9	16.1	23	4.6	10.4	15
F9	4.6	9.2	13.8	5.8	9.2	15	4.6	13.8	18.4

BEAM ON Loaded belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

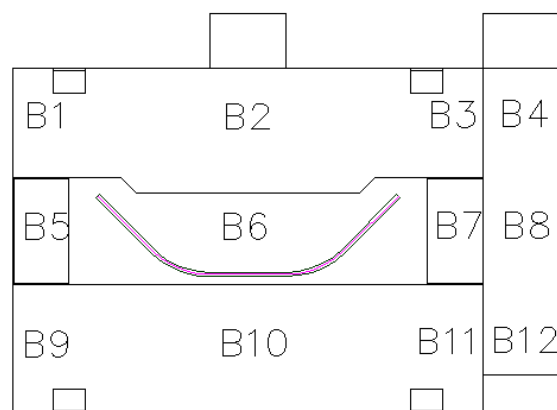
	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
F1	3.5	9.2	12.7	6.9	9.2	16.1	5.8	13.8	19.6
F2	9.2	11.5	20.7	8.1	13.8	21.9	3.5	11.5	15
F3	4.6	11.5	16.1	4.6	8.1	12.7	4.6	11.5	16.1
F4	18.4	34.5	52.9	16.1	28.8	44.9	6.9	11.5	18.4
F5	36.8	92	128.8	23	51.8	74.8	8.1	11.5	19.6
F6	18.4	41.4	59.8	17.3	28.8	46	6.9	13.8	20.7
F7	3.5	8.1	11.5	5.8	6.9	12.7	4.6	11.5	16.1
F8	8.1	11.5	19.6	6.9	16.1	23	4.6	9.2	13.8
F9	4.6	9.2	13.8	6.9	9.2	16.1	3.5	13.8	17.3

Source Storage Drum Front**Source Storage Drum Top****Source storage drum radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252**

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
A	38	28.8	67.9	21.9	16.1	38	10.4	11.5	21.9
B	362.3	370.3	732.6	93.2	177.1	270.3	28.8	38	66.7
C	322	322	644	107	201.3	308.2	27.6	41.4	69
D	322	354.2	676.2	100.1	209.3	309.4	26.5	44.9	71.3
E	322	241.5	563.5	104.7	144.9	249.6	23	44.9	67.9
F	322	289.8	611.8	112.7	193.2	305.9	28.8	36.8	65.6

Appendix F Radiation Survey Without Tunnel Extensions

NOTE: Radiation levels for the Front, Top, Rear and Bottom surfaces are unchanged when the tunnel extensions are removed.



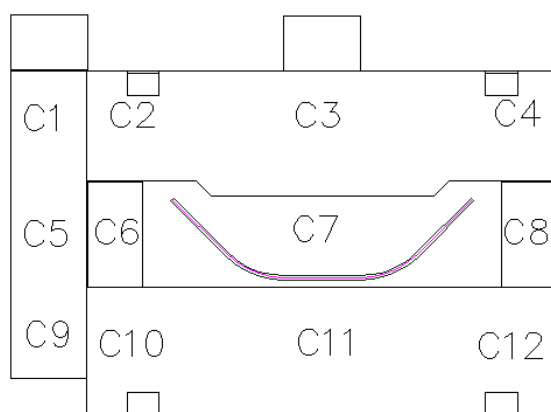
LEFT SIDE

BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
B1	18.4	243.8	262.2	28.8	334.7	363.4	9.2	154.1	163.3
B2	20.7	886.7	907.4	63.3	822.3	885.5	15	218.5	233.5
B3	16.1	188.6	204.7	32.2	355.4	387.6	10.4	144.9	154.1
B4	6.9	8.1	15	17.3	121.9	139.2	9.2	128.8	136.9
B5	28.8	262.2	291	32.2	211.6	243.8	6.9	64.4	71.3
B6	97.8	1416.8	1514.6	63.3	608.4	671.6	12.7	79.4	92
B7	28.8	300.2	328.9	32.2	240.4	272.6	6.9	65.6	72.5
B8	4.6	12.7	17.3	12.7	90.9	103.5	6.9	55.2	62.1
B9	10.4	44.9	55.2	13.8	52.9	66.7	8.1	40.3	47.2
B10	42.6	121.9	164.5	24.2	159.9	184	10.4	56.4	66.7
B11	10.4	56.4	66.7	13.8	81.7	95.5	8.1	38	46
B12	4.6	9.2	13.8	8.1	35.7	43.7	6.9	31.1	36.8

BEAM ON Loaded belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
B1	18.4	97.8	116.2	21.9	92	113.9	9.2	35.7	44.9
B2	69	185.2	254.2	36.8	144.9	181.7	11.5	44.9	56.4
B3	20.7	95.5	115	23	94.3	117.3	8.1	34.5	42.6
B4	3.5	15	17.3	2.3	28.8	31.1	1.2	31.1	32.2
B5	46	127.7	173.7	28.8	134.6	163.3	9.2	26.5	35.7
B6	N/A	N/A	N/A	34.5	202.4	236.9	11.5	27.6	39.1
B7	48.3	127.7	176	26.5	127.7	154.1	9.2	25.3	34.5
B8	6.9	8.1	15	4.6	13.8	18.4	2.3	29.9	32.2
B9	19.6	25.3	44.9	18.4	26.5	44.9	8.1	18.4	26.5
B10	41.4	32.2	73.6	25.3	43.7	69	9.2	20.7	29.9
B11	21.9	26.5	47.2	17.3	26.5	43.7	8.1	17.3	25.3
B12	3.5	6.9	10.4	2.3	12.7	15	1.2	15	16.1



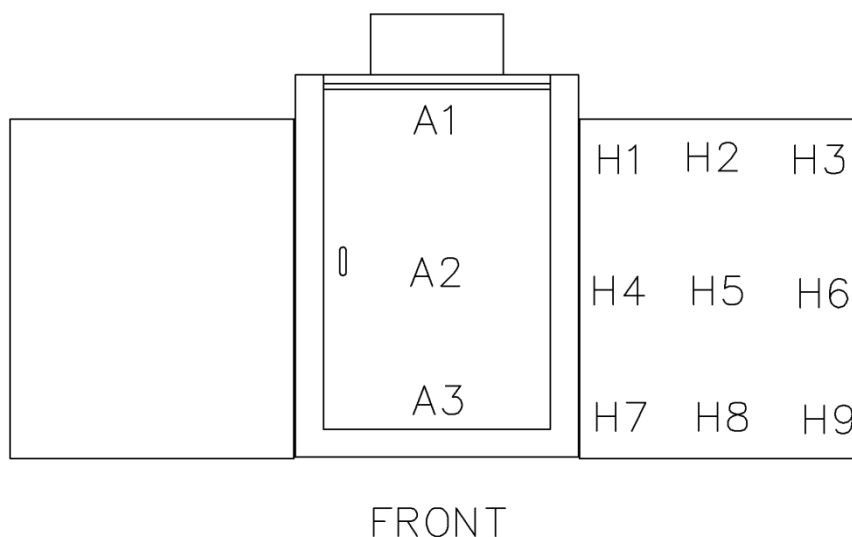
RIGHT SIDE

BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
C1	5.8	8.1	13.8	16.1	126.5	142.6	9.2	121.9	131.1
C2	13.8	177.1	190.9	34.5	358.8	393.3	10.4	151.8	162.2
C3	20.7	908.5	929.2	59.8	816.5	876.3	13.8	213.9	227.7
C4	17.3	232.3	249.6	32.2	346.2	378.4	8.1	154.1	162.2
C5	4.6	11.5	16.1	11.5	96.6	108.1	6.9	49.5	56.4
C6	25.3	312.8	338.1	34.5	247.3	281.8	6.9	71.3	78.2
C7	92	1403	1495	63.3	595.7	659	11.5	74.8	86.3
C8	32.2	253	285.2	29.9	204.7	234.6	6.9	59.8	66.7
C9	4.6	8.1	12.7	8.1	32.2	40.3	6.9	36.8	43.7
C10	9.2	59.8	69	13.8	86.3	100.1	8.1	33.4	41.4
C11	43.7	117.3	161	20.7	140.3	161	10.4	51.8	62.1
C12	10.4	48.3	58.7	11.5	50.6	62.1	8.1	36.8	44.9

BEAM ON Loaded belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

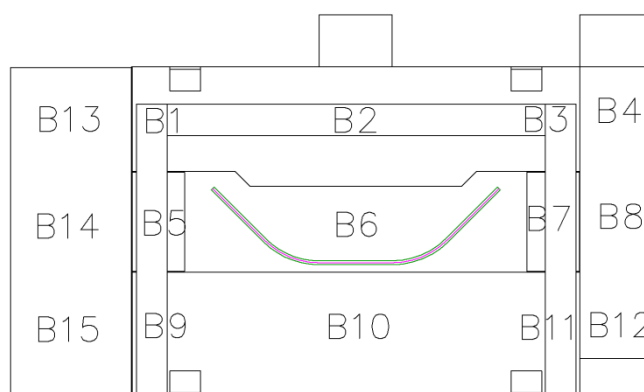
	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
C1	2.3	16.1	18.4	2.3	27.6	29.9	1.2	28.8	29.9
C2	23	89.7	112.7	20.7	98.9	119.6	6.9	36.8	43.7
C3	63.3	178.3	241.5	34.5	151.8	186.3	10.4	48.3	58.7
C4	20.7	103.5	124.2	20.7	89.7	110.4	9.2	32.2	41.4
C5	6.9	9.2	16.1	4.6	11.5	16.1	2.3	32.2	34.5
C6	46	135.7	181.7	25.3	120.8	146.1	9.2	21.9	31.1
C7	N/A	N/A	N/A	34.5	201.3	235.8	11.5	25.3	36.8
C8	44.9	134.6	179.4	29.9	128.8	158.7	9.2	27.6	36.8
C9	3.5	5.8	9.2	2.3	13.8	16.1	1.2	13.8	15
C10	19.6	27.6	47.2	17.3	27.6	44.9	8.1	18.4	26.5
C11	39.1	32.2	71.3	23	46	69	9.2	24.2	33.4
C12	18.4	26.5	44.9	19.6	23	42.6	9.2	17.3	26.5

Appendix G Radiation Survey With Automatic Source Drive Option**BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252**

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
A1	2.3	6.9	9.2	2.3	5.8	8.1	1.2	4.6	4.6
A2	4.6	6.9	10.4	2.3	4.6	6.9	2.3	3.5	5.8
A3	2.3	4.6	6.9	2.3	4.6	6.9	2.3	4.6	6.9
H1	10.4	26.5	36.8	9.2	12.7	21.9	2.3	3.5	5.8
H2	8.1	10.4	18.4	5.8	10.4	16.1	2.3	4.6	6.9
H3	5.8	9.2	15	4.6	8.1	12.7	1.2	3.5	4.6
H4	11.5	12.7	24.2	8.1	8.1	16.1	3.5	4.6	8.1
H5	6.9	4.6	11.5	5.8	6.9	12.7	2.3	4.6	6.9
H6	5.8	4.6	10.4	4.6	5.8	10.4	2.3	3.5	5.8
H7	8.1	10.4	18.4	5.8	8.1	13.8	4.6	5.8	10.4
H8	8.1	9.2	17.3	5.8	5.8	11.5	4.6	4.6	9.2
H9	5.8	6.9	12.7	4.6	4.6	9.2	3.5	4.6	8.1

BEAM OFF Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
A1	0	0	0	0	0	0	0	1.2	1.2
A2	1.2	0	1.2	0	0	0	0	1.2	1.2
A3	0	0	0	0	0	0	0	0	0
H1	1.2	1.2	2.3	0	0	0	0	3.5	3.5
H2	2.3	1.2	3.5	0	0	0	0	2.3	2.3
H3	1.2	0	1.2	0	2.3	2.3	0	1.2	1.2
H4	0	1.2	1.2	0	0	0	0	0	0
H5	0	1.2	1.2	0	0	0	0	0	0
H6	0	0	0	0	1.2	1.2	0	0	0
H7	0	0	0	0	1.2	1.2	0	1.2	1.2
H8	0	0	0	0	0	0	0	1.2	1.2
H9	0	0	0	0	1.2	1.2	0	1.2	1.2



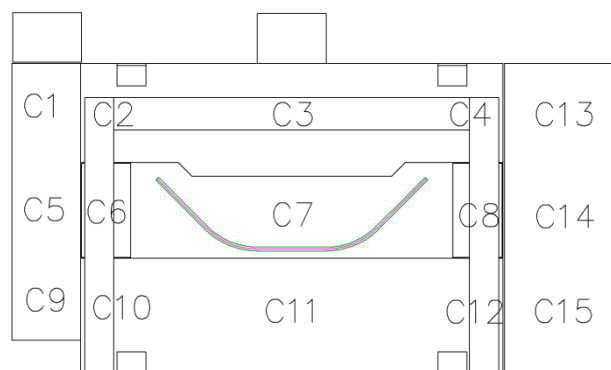
LEFT SIDE

BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
B1	27.6	95.5	123.1	19.6	61	80.5	10.4	31.1	41.4
B2	33.4	104.7	138	23	85.1	108.1	11.5	31.1	42.6
B3	25.3	84	109.3	18.4	51.8	70.2	10.4	26.5	36.8
B4	6.9	8.1	15	8.1	10.4	18.4	5.8	9.2	15
B5	25.3	66.7	92	18.4	46	64.4	10.4	23	33.4
B6	33.4	63.3	96.6	23	52.9	75.9	10.4	21.9	32.2
B7	27.6	48.3	75.9	18.4	36.8	55.2	10.4	27.6	38
B8	4.6	12.7	17.3	6.9	4.6	11.5	5.8	4.6	10.4
B9	18.4	38	56.4	15	36.8	51.8	8.1	26.5	34.5
B10	20.7	47.2	67.9	15	40.3	55.2	8.1	34.5	42.6
B11	18.4	38	56.4	12.7	25.3	38	4.6	27.6	32.2
B12	4.6	9.2	13.8	8.1	9.2	17.3	5.8	6.9	12.7
B13	38	9.2	47.2	36.8	9.2	46	3.5	6.9	10.4
B14	25.3	5.8	31.1	21.9	4.6	26.5	3.5	5.8	9.2
B15	9.2	2.3	11.5	8.1	2.3	10.4	3.5	3.5	6.9

BEAM OFF Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
B1	3.5	2.3	5.8	2.3	2.3	4.6	1.2	1.2	2.3
B2	3.5	2.3	5.8	2.3	1.2	3.5	1.2	1.2	2.3
B3	4.6	2.3	6.9	2.3	2.3	4.6	0	1.2	1.2
B4	0	0	0	1.2	0	1.2	1.2	0	1.2
B5	3.5	2.3	3.5	3.5	1.2	4.6	2.3	2.3	4.6
B6	2.3	3.5	3.5	2.3	2.3	4.6	1.2	1.2	2.3
B7	2.3	2.3	2.3	2.3	1.2	3.5	1.2	1.2	2.3
B8	1.2	0	1.2	2.3	0	2.3	1.2	0	1.2
B9	4.6	2.3	6.9	3.5	1.2	4.6	2.3	1.2	3.5
B10	3.5	2.3	5.8	3.5	2.3	5.8	2.3	2.3	4.6
B11	1.2	1.2	2.3	2.3	2.3	4.6	1.2	1.2	2.3
B12	0	0	0	1.2	1.2	2.3	0	0	0
B13	2.3	2.3	4.6	2.3	2.3	4.6	1.2	1.2	2.3
B14	11.5	6.9	18.4	6.9	1.2	8.1	2.3	1.2	3.5
B15	25.3	6.9	32.2	11.5	2.3	13.8	2.3	0	2.3



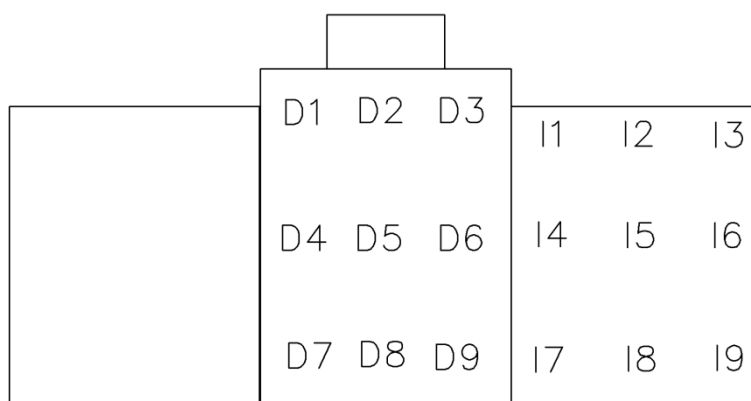
RIGHT SIDE

BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
C1	5.8	8.1	13.8	8.1	10.4	18.4	5.8	9.2	15
C2	25.3	84	109.3	18.4	51.8	70.2	10.4	26.5	36.8
C3	33.4	104.7	138	23	85.1	108.1	11.5	31.1	42.6
C4	27.6	95.5	123.1	19.6	61	80.5	10.4	31.1	41.4
C5	4.6	11.5	16.1	6.9	4.6	11.5	5.8	4.6	10.4
C6	27.6	48.3	75.9	18.4	36.8	55.2	10.4	27.6	38
C7	33.4	63.3	96.6	23	52.9	75.9	10.4	21.9	32.2
C8	25.3	66.7	92	18.4	46	64.4	10.4	23	33.4
C9	4.6	8.1	12.7	8.1	9.2	17.3	5.8	6.9	12.7
C10	18.4	38	56.4	12.7	25.3	38	4.6	27.6	32.2
C11	20.7	47.2	67.9	15	40.3	55.2	8.1	34.5	42.6
C12	18.4	38	56.4	15	36.8	51.8	8.1	26.5	34.5
C13	38	9.2	47.2	36.8	9.2	46	3.5	6.9	10.4
C14	25.3	5.8	31.1	21.9	4.6	26.5	3.5	5.8	9.2
C15	9.2	2.3	11.5	8.1	2.3	10.4	3.5	3.5	6.9

BEAM OFF Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
C1	0	0	0	1.2	0	1.2	1.2	0	1.2
C2	4.6	2.3	6.9	2.3	2.3	4.6	0	1.2	1.2
C3	3.5	2.3	5.8	2.3	1.2	3.5	1.2	1.2	2.3
C4	3.5	2.3	5.8	2.3	2.3	4.6	1.2	1.2	2.3
C5	1.2	0	1.2	2.3	0	2.3	1.2	0	1.2
C6	2.3	2.3	2.3	2.3	1.2	3.5	1.2	1.2	2.3
C7	2.3	3.5	3.5	2.3	2.3	4.6	1.2	1.2	2.3
C8	3.5	2.3	3.5	3.5	1.2	4.6	2.3	2.3	4.6
C9	0	0	0	1.2	1.2	2.3	0	0	0
C10	1.2	1.2	2.3	2.3	2.3	4.6	1.2	1.2	2.3
C11	3.5	2.3	5.8	3.5	2.3	5.8	2.3	2.3	4.6
C12	4.6	2.3	6.9	3.5	1.2	4.6	2.3	1.2	3.5
C13	2.3	2.3	4.6	2.3	2.3	4.6	1.2	1.2	2.3
C14	11.5	6.9	18.4	6.9	1.2	8.1	2.3	1.2	3.5
C15	25.3	6.9	32.2	11.5	2.3	13.8	2.3	0	2.3



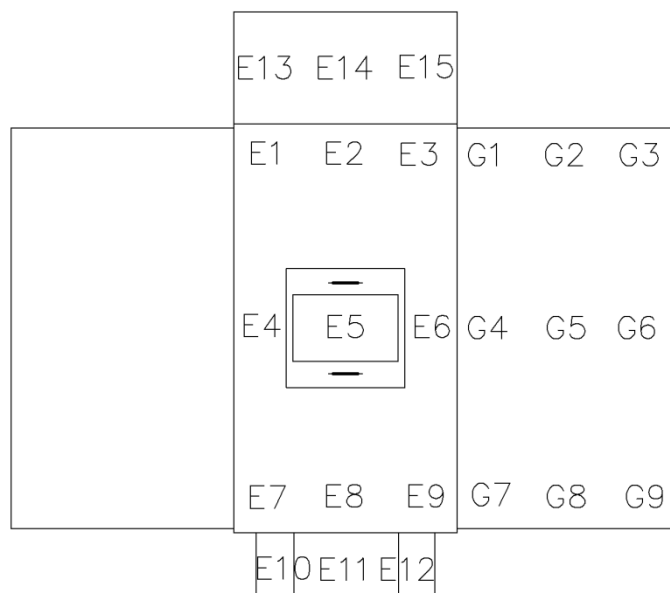
REAR (EXTRA SHIELDING BLOCK)

BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
D1	1.2	2.3	3.5	1.2	4.6	5.8	0	2.3	2.3
D2	1.2	1.2	2.3	1.2	2.3	3.5	0	3.5	3.5
D3	1.2	1.2	2.3	1.2	2.3	3.5	0	4.6	4.6
D4	1.2	0	1.2	2.3	1.2	3.5	0	2.3	2.3
D5	1.2	2.3	3.5	1.2	1.2	2.3	1.2	3.5	4.6
D6	1.2	2.3	3.5	0	2.3	2.3	1.2	2.3	3.5
D7	0	2.3	2.3	1.2	2.3	3.5	0	2.3	2.3
D8	0	2.3	2.3	0	2.3	2.3	0	1.2	1.2
D9	0	2.3	2.3	1.2	2.3	3.5	0	3.5	3.5

BEAM OFF Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
D1	1.2	1.2	2.3	1.2	0	1.2	0	0	0
D2	1.2	1.2	2.3	1.2	0	1.2	0	1.2	1.2
D3	1.2	0	1.2	0	1.2	1.2	0	0	0
D4	4.6	0	4.6	3.5	1.2	4.6	1.2	1.2	2.3
D5	5.8	1.2	6.9	3.5	1.2	4.6	1.2	1.2	2.3
D6	4.6	0	4.6	3.5	1.2	4.6	1.2	1.2	2.3
D7	6.9	0	6.9	3.5	1.2	4.6	1.2	2.3	3.5
D8	8.1	1.2	9.2	3.5	1.2	4.6	1.2	0	1.2
D9	6.9	0	6.9	3.5	0	3.5	1.2	1.2	2.3
I1	1.2	1.2	2.3	2.3	0	2.3	1.2	1.2	2.3
I2	2.3	1.2	3.5	2.3	1.2	3.5	0	1.2	1.2
I3	1.2	1.2	2.3	1.2	1.2	2.3	1.2	0	1.2
I4	9.2	4.6	13.8	8.1	3.5	11.5	2.3	0	2.3
I5	3.5	1.2	4.6	4.6	1.2	5.8	1.2	0	1.2
I6	1.2	0	1.2	3.5	1.2	4.6	1.2	0	1.2
I7	15	5.8	20.7	10.4	2.3	12.7	1.2	0	1.2
I8	6.9	2.3	9.2	6.9	2.3	9.2	1.2	1.2	2.3
I9	1.2	1.2	2.3	3.5	1.2	4.6	1.2	2.3	3.5



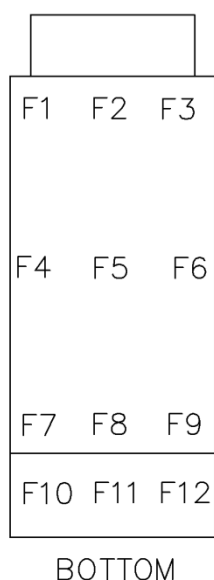
TOP

BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
E1	10.4	75.9	86.3	9.2	94.3	103.5	3.5	40.3	43.7
E2	23	113.9	136.9	11.5	105.8	117.3	5.8	35.7	41.4
E3	10.4	74.8	85.1	9.2	96.6	105.8	4.6	42.6	46
E4	9.2	51.8	61	8.1	52.9	61	4.6	27.6	32.2
E5	9.2	75.9	85.1	5.8	51.8	57.5	4.6	16.1	20.7
E6	9.2	50.6	59.8	9.2	55.2	64.4	4.6	25.3	29.9
E7	9.2	74.8	84	8.1	98.9	107	4.6	43.7	47.2
E8	24.2	112.7	136.9	11.5	103.5	115	5.8	33.4	39.1
E9	10.4	75.9	86.3	10.4	97.8	108.1	3.5	44.9	48.3
E10	2.3	6.9	9.2	1.2	3.5	4.6	2.3	6.9	9.2
E11	2.3	8.1	10.4	2.3	6.9	9.2	2.3	9.2	11.5
E12	2.3	8.1	10.4	1.2	3.5	4.6	2.3	8.1	10.4
E13	1.2	2.3	3.5	1.2	6.9	8.1	1.2	2.3	3.5
E14	1.2	2.3	3.5	2.3	4.6	6.9	1.2	2.3	3.5
E15	1.2	1.2	2.3	2.3	3.5	5.8	1.2	1.2	2.3
G1	4.6	8.1	12.7	2.3	8.1	10.4	2.3	12.7	15
G2	4.6	13.8	18.4	3.5	9.2	12.7	2.3	6.9	9.2
G3	4.6	10.4	15	3.5	6.9	10.4	1.2	4.6	5.8
G4	12.7	23	35.7	5.8	23	28.8	2.3	25.3	27.6
G5	11.5	28.8	40.3	8.1	17.3	25.3	3.5	13.8	17.3
G6	5.8	10.4	16.1	4.6	13.8	18.4	1.2	10.4	11.5
G7	5.8	8.1	13.8	2.3	9.2	11.5	2.3	11.5	13.8
G8	5.8	12.7	18.4	3.5	11.5	15	1.2	6.9	8.1
G9	3.5	10.4	13.8	3.5	5.8	9.2	2.3	4.6	6.9

BEAM OFF Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
E1	2.3	1.2	3.5	2.3	1.2	3.5	0	0	0
E2	2.3	1.2	3.5	2.3	1.2	3.5	0	1.2	1.2
E3	2.3	1.2	3.5	2.3	1.2	3.5	1.2	1.2	2.3
E4	2.3	0	2.3	2.3	1.2	3.5	1.2	1.2	2.3
E5	1.2	1.2	2.3	2.3	2.3	4.6	0	1.2	1.2
E6	2.3	1.2	3.5	2.3	1.2	3.5	0	1.2	1.2
E7	0	0	0	2.3	1.2	3.5	0	1.2	1.2
E8	0	0	0	3.5	1.2	4.6	1.2	1.2	2.3
E9	0	0	0	2.3	1.2	3.5	0	1.2	1.2
E10	0	1.2	1.2	0	1.2	1.2	0	0	0
E11	0	0	0	0	1.2	1.2	0	0	0
E12	0	0	0	0	0	0	0	0	0
E13	1.2	0	1.2	1.2	1.2	2.3	0	1.2	1.2
E14	1.2	1.2	2.3	1.2	0	1.2	1.2	1.2	2.3
E15	1.2	1.2	2.3	1.2	0	1.2	0	1.2	1.2
G1	6.9	0	6.9	2.3	1.2	3.5	0	0	0
G2	8.1	1.2	9.2	2.3	1.2	3.5	0	1.2	1.2
G3	3.5	1.2	4.6	2.3	1.2	3.5	0	1.2	1.2
G4	3.5	1.2	4.6	1.2	1.2	2.3	0	2.3	2.3
G5	4.6	1.2	5.8	1.2	1.2	2.3	0	1.2	1.2
G6	0	1.2	1.2	2.3	0	2.3	0	1.2	1.2
G7	1.2	0	1.2	0	0	0	0	1.2	1.2
G8	2.3	1.2	3.5	2.3	0	2.3	0	1.2	1.2
G9	2.3	1.2	3.5	3.5	1.2	4.6	0	0	0

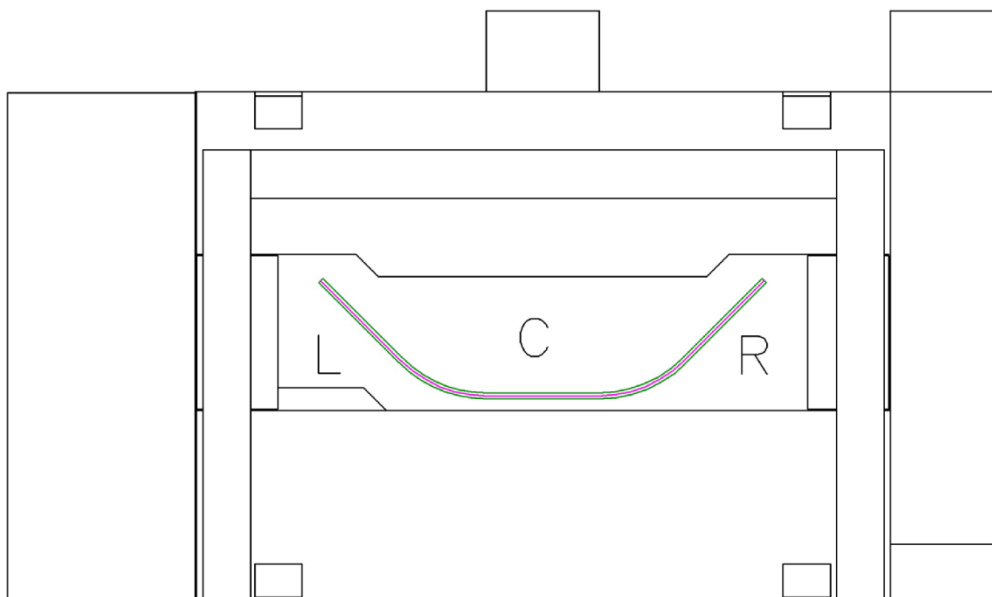
**BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252**

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
F1	3.5	10.4	13.8	5.8	10.4	16.1	5.8	12.7	18.4
F2	8.1	10.4	18.4	8.1	16.1	24.2	4.6	11.5	16.1
F3	4.6	10.4	15	4.6	9.2	13.8	4.6	12.7	17.3
F4	19.6	39.1	58.7	16.1	32.2	48.3	6.9	13.8	20.7
F5	41.4	87.4	128.8	25.3	48.3	73.6	6.9	15	21.9
F6	20.7	40.3	61	15	29.9	44.9	5.8	13.8	19.6
F7	3.5	9.2	12.7	5.8	9.2	15	5.8	13.8	19.6
F8	9.2	10.4	19.6	6.9	16.1	23	4.6	10.4	15
F9	4.6	9.2	13.8	5.8	9.2	15	4.6	13.8	18.4
F10	2.3	6.9	9.2	4.6	6.9	11.5	3.5	9.2	12.7
F11	5.8	5.8	11.5	5.8	10.4	16.1	4.6	8.1	12.7
F12	3.5	4.6	8.1	4.6	6.9	11.5	3.5	8.1	11.5

BEAM OFF Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
F1	1.2	4.6	5.8	2.3	8.1	10.4	4.6	10.4	15
F2	2.3	5.8	8.1	5.8	13.8	19.6	3.5	9.2	12.7
F3	1.2	4.6	5.8	2.3	6.9	9.2	3.5	10.4	13.8
F4	3.5	11.5	15	5.8	10.4	16.1	5.8	12.7	18.4
F5	9.2	11.5	20.7	8.1	16.1	24.2	4.6	11.5	16.1
F6	3.5	10.4	13.8	4.6	9.2	13.8	4.6	12.7	17.3
F7	20.7	40.3	61	17.3	32.2	49.5	5.8	13.8	19.6
F8	40.3	85.1	125.4	23	48.3	71.3	6.9	15	21.9
F9	20.7	39.1	59.8	16.1	29.9	46	6.9	13.8	20.7
F10	15	34.5	49.5	13.8	28.8	42.6	4.6	11.5	16.1
F11	34.5	78.2	112.7	20.7	47.2	67.9	4.6	12.7	17.3
F12	16.1	32.2	48.3	15	27.6	42.6	4.6	11.5	16.1

NOTE: These radiation levels are inside the tunnel extensions at the idlers closest to the On Belt Analyser-5 with the BEAM OFF.



BEAM OFF Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

At Left, Centre and Right hand side rollers closest to On Belt Analyser-5

	Gamma	Neutron	Total
L	40.3	66.7	107
C	13.8	38	50.6
R	6.9	21.9	28.8

Attachment II

Radiation Profiles Analyzer-6

7. Radiation Dose Rates

An On Belt Analyser-6 radiation survey was conducted from 17th to 26th October 2006. Instruments used were:

- A. Neutron Meter: Model 12-4 neutron dose meter
S/N 227972
Manufactured by Ludlum Measurements Inc.
Sweetwater Texas USA
Calibrated by Ludlum to ANSI/NCSL Z540-1-1994 and
ANSI N323-1978 standard on 27th February 2006
- B. Gamma Meter: Model 9 ionisation chamber gamma dose meter
S/N 226089
Manufactured by Ludlum Measurements Inc.
Sweetwater Texas USA
Calibrated by Ludlum to ANSI/NCSL Z540-1-1994 and
ANSI N323-1978 standard on 27th February 2006

At the time of the On Belt Analyser-6 survey, the Californium source that was used had a total activity of 0.85 GBq (42.8 micrograms).

At the time of the Source Storage drum survey in May 2002, different Californium sources were used and had a total activity of 1.4 GBq (71.4 micrograms).

All measured dose rates have been scaled for a 57.5ug Californium source.

Dose Rate Measurements External to the Analyser

Dose rates were measured on all accessible surfaces of the analyser.

Gamma measurements were made at distances of 5cm, 30cm and 100cm from the surface of the analyser.

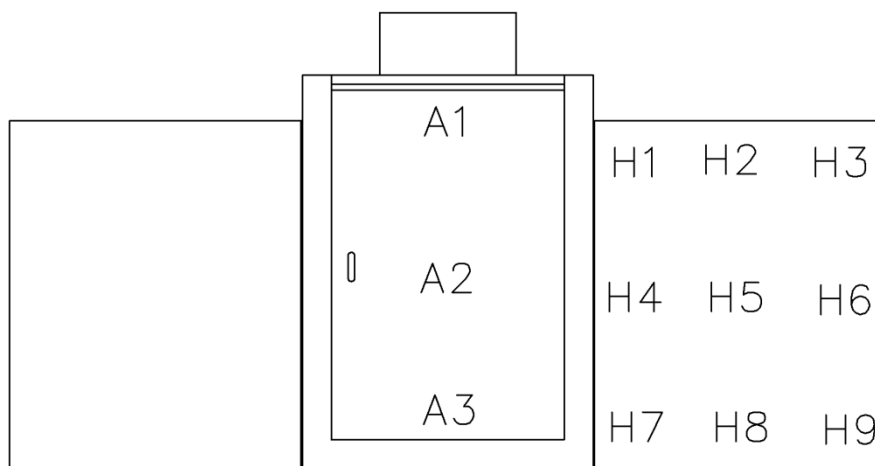
The neutron dosimeter consists of a neutron counter tube inside a polyethylene sphere 230 mm in diameter. The 5cm neutron measurements were made with the sphere in contact the surface of the analyser. Measurements were also made with the centre of the sphere at 30cm and 100cm from the surface of the analyser.

The following measurements were taken:

1. On Belt Analyser-6, Belt empty.
2. On Belt Analyser-6, Belt loaded with 150kg/m of crushed material.
3. Source storage drum

This is the condition of the source storage drum when source rod is stored in the central tube of the drum. The outer rod is unscrewed and stored inside the analyser's electronics cabinet.

NOTE: The reference points illustrated on the drawings indicate the point where the measurements are made at the surface of the analyser. Measurements are made at 5cm, 30cm and 100cm adjacent to and on a level plane from that reference point.



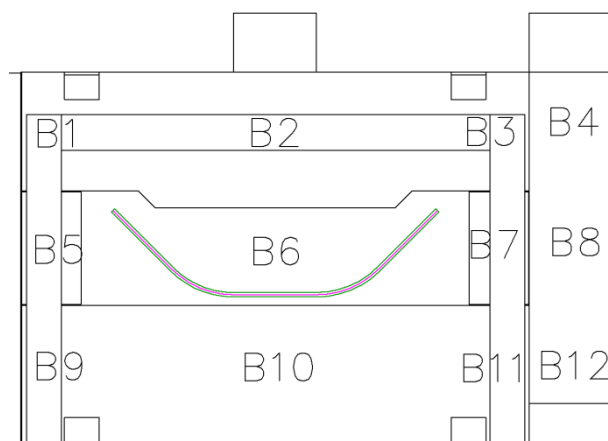
FRONT

BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
A1	0.7	8.1	8.7	1	7.1	8.2	1.4	6.2	7.5
A2	1.4	7.1	8.5	1.4	6.4	7.8	1.4	5.8	7
A3	1.4	5.8	7	1	5.8	6.7	0.7	5.8	6.3
H1	7.4	15.4	22.9	4.4	12.1	16.4	1.4	8.5	9.9
H2	4.7	7.6	12.3	3	6.7	9.7	1.4	5.8	7
H3	3.3	10.9	14.3	2.3	7.4	9.8	1.4	3.8	5.2
H4	5.4	6.2	11.5	3.3	7.8	11.2	1.4	9.5	10.8
H5	4.7	6.7	11.4	3	5.2	8.3	1.4	3.8	5.2
H6	3.3	4.3	7.6	2.3	6	8.3	1.4	7.6	9
H7	2.6	4.3	7	2.3	6.7	9	2.1	9.1	11
H8	2.6	3.8	6.4	1.7	4.3	6	0.7	4.7	5.4
H9	2.6	4.3	7	2.1	4.3	6.3	1.4	4.3	5.6

BEAM ON Loaded belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
A1	1.4	0	1.4	1	2.9	3.9	0.7	5.8	6.3
A2	1.4	0	1.4	1.7	2	3.6	1.4	3.8	5.2
A3	0.7	0	0.7	0.7	0	0.7	0.7	0	0.7
H1	5.4	7.1	12.5	3.3	6.4	9.8	1.4	5.8	7
H2	4	4.7	8.7	2.6	4.7	7.5	1.4	4.7	6.1
H3	2.1	7.6	9.7	1.7	6.2	7.8	1.4	4.7	6.1
H4	6.1	7.6	13.7	4	5.8	9.8	2.1	3.8	5.9
H5	5.4	7.1	12.5	3.3	6	9.3	1.4	4.7	6.1
H6	3.3	4.7	8.2	2.3	5.8	8.1	1.4	6.7	8.1
H7	2.6	0	2.6	2.1	0	2.1	1.4	0	1.4
H8	2.6	0	2.6	2.1	0	2.1	1.4	0	1.4
H9	2.1	0	2.1	1.7	0	1.7	1.4	0	1.4



LEFT SIDE

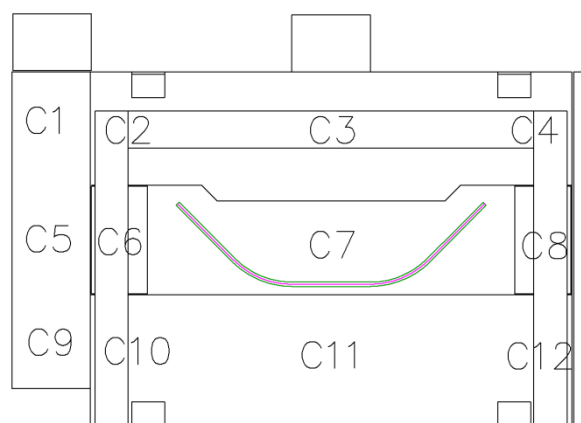
BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
B1	17.5	129.4	146.9	11.4	86.1	97.5	5.4	42.8	48.2
B2	21.5	231.2	252.7	14.1	144.1	158.2	6.7	57	63.8
B3	16.1	127	143.1	11	86.6	97.6	6.1	46.1	52.2
B4	1.4	19	20.4	2.8	21.3	26.3	1.5	18.2	19.7
B5	17.5	100.4	117.8	11	68.5	79.6	4.7	36.6	41.3
B6	24.2	163.2	187.3	15.1	102.7	117.9	6.1	42.3	48.4
B7	17.5	108	125.5	11.7	73.9	85.7	6.1	39.9	46
B8	3.3	15.6	19.1	3.7	17.4	21	3.1	15.4	18.5
B9	13.5	105.1	118.6	8.4	73.3	81.7	3.3	41.4	44.7
B10	16.1	131.3	147.4	10.1	90.6	100.6	4	49.9	53.9
B11	14.7	108	122.7	8.7	76.6	85.3	2.6	45.2	47.8
B12	2.1	4.3	6.3	2.5	4.8	7.4	2.2	4.1	6.3

BEAM ON Loaded belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
B1	12.1	76.6	88.7	7.4	51.2	58.5	2.6	25.6	28.4
B2	18.7	103.7	122.5	11.4	68.3	79.7	4	32.8	36.8
B3	12.1	77.5	89.6	7.4	52.6	59.9	2.6	27.6	30.2
B4	4	10.9	15	2.6	8.3	11	1.4	5.8	7
B5	10.7	64.2	75	7	48.1	55.1	3.3	31.9	35.2
B6	20.1	82.3	102.5	14.1	56.6	70.7	8.1	30.9	39
B7	12.1	66.6	78.7	7.4	48.5	55.9	2.6	30.5	33.1
B8	3.3	15.2	18.6	2.6	10.9	13.6	2.1	6.7	8.6
B9	10.7	55.2	65.9	8.4	40.1	48.5	6.1	25.2	31.3
B10	20.1	85.1	105.2	13.5	60.8	74.3	6.7	36.6	43.4
B11	10.7	50.9	61.6	8.4	40.5	48.9	6.1	30	36
B12	2.1	0	2.1	1.7	0	1.7	1.4	0	1.4

Note: B1-11 points are at end of the tunnel extension. B1-3, B5-7 and B9-11 measurements were taken slightly inside tunnel extensions. B2, B6 and B10 are normally inaccessible.



RIGHT SIDE

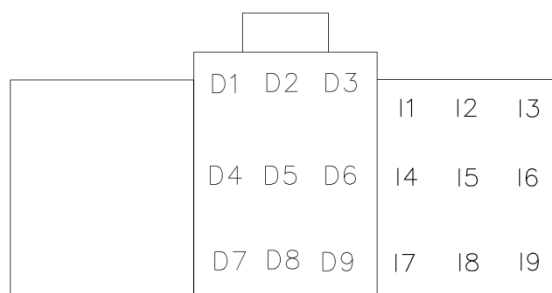
BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
C1	1.2	19.4	20.5	2.6	21.4	24	1.8	18.1	19.9
C2	16	127	142.9	11.2	86.7	97.9	5.6	46.1	51.8
C3	21	231.2	252.2	13.8	144.7	158.5	6.3	57.2	63.5
C4	17.8	129.5	147.3	11.4	86.5	97.9	5.8	42.7	48.4
C5	3.2	15.4	18.6	4.1	17.1	21.3	3.2	15.3	18.5
C6	17.7	107.9	125.7	12.2	73.8	86	5.6	40.4	46.1
C7	23.7	163.6	187.2	14.5	103	117.5	6.1	42.2	48.3
C8	17.5	99.9	117.4	11.3	68.4	79.7	4.7	36.1	40.8
C9	2.5	4.5	7	2.4	4.4	6.7	1.6	4.5	6.1
C10	15.1	108.2	123.3	8.7	76.2	85	2.6	45.7	48.3
C11	15.6	131.1	146.7	10.1	91	101.1	4.5	50.4	54.9
C12	13.1	105.2	118.3	7.8	73.3	81.1	3.6	41.9	45.4

BEAM ON Loaded belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
C1	3.7	11.4	15.1	2.8	8.2	10.9	1.2	5.8	7
C2	12	77.9	89.8	7.5	52.9	60.4	2.9	27.8	30.7
C3	19.1	103.3	122.4	10.8	68.5	79.4	4.5	32.7	37.1
C4	11.7	76.9	88.7	7.9	51.2	59	2.8	25.5	28.3
C5	3	14.8	17.8	2.4	10.8	13.2	2.4	6.6	9
C6	12.3	66.8	79.1	7.1	48.9	56.1	2.2	30.9	33
C7	20.5	82.2	102.7	14.5	56	70.5	7.9	31.4	39.3
C8	10.1	63.9	74.2	6.7	48	54.7	3.2	31.5	34.6
C9	1.7	-0.2	1.5	1.3	-0.1	1.2	1.2	0.2	1.4
C10	10.4	51.4	61.8	8.4	40.5	48.9	5.9	29.9	35.8
C11	20.4	85.4	105.7	13.3	61.3	74.5	6.9	36.9	43.7
C12	10.5	55.8	66.2	8.6	39.7	48.3	6.4	24.7	31.1

Note: C2-12 points are at end of the tunnel extension. C2-4, C6-8 and C10-12 measurements were taken slightly inside tunnel extensions. C3, C7 and C11 are normally inaccessible.



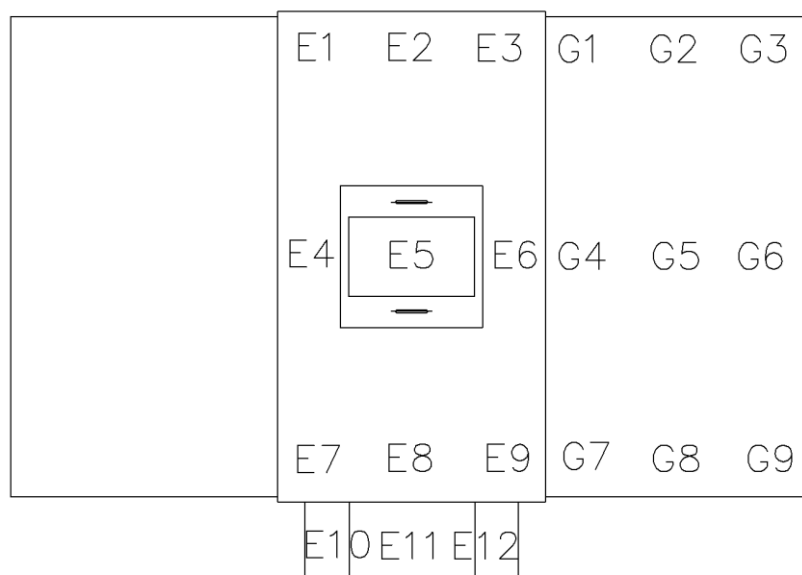
REAR

BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
D1	4	9.5	13.6	2.3	8.5	10.9	0.7	7.6	8.3
D2	4	11.8	15.9	2.6	8.9	11.5	1.4	5.8	7
D3	4	11.4	15.4	2.6	8.3	11	1.4	5.2	6.6
D4	4.7	7.1	11.8	3	6.9	9.9	1.4	6.7	8.1
D5	4.7	7.1	11.8	3	7.4	10.4	1.4	7.6	9
D6	4.7	11.8	16.6	3	8.5	11.6	1.4	5.2	6.6
D7	2.1	0	2.1	1.4	0	1.4	0.7	0	0.7
D8	2.1	0	2.1	1	0	1	0	0	0
D9	2.1	0	2.1	1.4	0	1.4	0.7	0	0.7
I1	6.7	16.2	22.9	4.4	9.1	13.5	2.1	2	3.9
I2	6.1	10.5	16.6	3.7	6.9	10.6	1.4	3.3	4.7
I3	4	5.8	9.8	2.6	5.8	8.4	1.4	5.8	7
I4	7.4	7.1	14.5	4.4	6	10.4	1.4	4.7	6.1
I5	6.1	6.7	12.7	3.7	4	7.7	1.4	1.4	2.8
I6	4	7.1	11.2	2.6	5.8	8.4	1.4	4.3	5.6
I7	3.3	3.8	7.1	2.1	3.3	5.3	0.7	2.9	3.6
I8	4	4.3	8.3	2.6	4.7	7.5	1.4	5.2	6.6
I9	3.3	6.7	10	2.1	5.2	7.2	0.7	3.8	4.5

BEAM ON Loaded belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
D1	4.7	10	14.7	3	8.5	11.6	1.4	7.1	8.5
D2	4.7	9.5	14.3	3	6.9	9.9	1.4	4.3	5.6
D3	4.7	10	14.7	3	6	9	1.4	2	3.2
D4	4.7	3.3	8.1	2.6	2.6	5.3	0.7	2	2.5
D5	4.7	5.8	10.4	3	5.5	8.5	1.4	5.2	6.6
D6	4.7	8.1	12.8	2.6	6.2	8.9	0.7	4.3	4.9
D7	2.1	4.3	6.3	1.4	4.7	6.1	0.7	5.2	5.9
D8	2.1	2.4	4.4	1.4	3.6	4.9	0.7	4.7	5.4
D9	2.1	2.4	4.4	1.4	3.3	4.7	0.7	4.3	4.9
I1	4.9	7.6	12.5	3.6	6.4	10	1.6	5.4	6.9
I2	3.9	5.2	9.1	2.8	4.4	7	1	5.3	6.3
I3	2.1	7.1	9.2	2	5.6	7.6	1.5	4.5	6
I4	5.5	7.5	13	4.3	5.8	10.1	1.5	3.3	4.7
I5	5.8	7.6	13.3	3.2	6.4	9.7	1.2	4.8	6
I6	3.1	4.5	7.6	2.4	5.5	7.9	1.5	6.6	8.1
I7	2.2	0.5	2.6	2.2	-0.2	2	1	-0.2	0.8
I8	2.2	0	2.1	1.8	0	1.8	0.9	0	1
I9	1.7	0.1	1.8	1.2	0.1	1.3	1.4	0.3	1.6



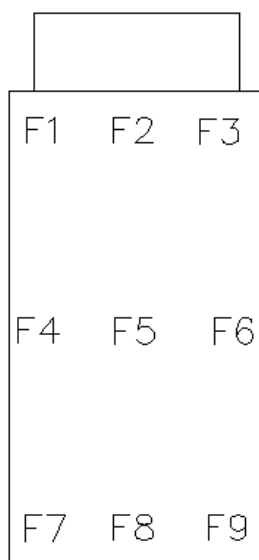
TOP

BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
E1	2.6	11.4	14.1	2.3	11.6	14	2.1	11.8	13.9
E2	2.6	6.2	8.9	2.6	9.8	12.4	2.6	13.3	16
E3	2.6	7.1	9.8	2.3	8.9	11.2	2.1	10.5	12.5
E4	10.7	48.5	59.2	10.7	39.4	50.3	10.7	30.5	41.2
E5	16.1	69	85.1	16.1	53.9	70.2	16.1	39	55.1
E6	10.7	51.4	62.1	10.7	43.2	54.1	10.7	35.2	45.9
E7	2.1	9.1	11	2.1	11.2	13.2	2.1	13.3	15.3
E8	2.1	9.5	11.5	2.1	13.1	15.1	2.1	16.7	18.6
E9	2.1	10.5	12.5	2.1	11.2	13.2	2.1	11.8	13.9
E10	1.4	6.7	8.1	1.4	8.3	9.7	1.4	10	11.4
E11	0.7	6.7	7.4	1	6.7	7.7	1.4	9.8	11.2
E12	1.4	6.7	8.1	1.4	8.3	9.7	1.4	10	11.4
G1	6.1	17.1	23.1	4	13.1	17.1	2.1	9.1	11
G2	6.1	15.6	21.7	4	13.1	17.1	2.1	10.5	12.5
G3	5.4	10.5	15.9	3.7	11.4	15.1	2.1	12.4	14.4
G4	17.5	50.9	68.3	10.4	40.7	51.1	3.3	30.5	33.8
G5	14.7	37.6	52.3	9.1	29.4	38.5	3.3	21.4	24.7
G6	6.7	17.6	24.3	5.1	18.1	23.1	3.3	18.5	21.9
G7	6.7	24.7	31.4	4.4	20	24.4	2.1	15.2	17.3
G8	8.1	19	27	5.1	16.4	21.4	2.1	13.8	15.8
G9	6.1	13.3	19.3	4	14.3	18.3	2.1	15.2	17.3

BEAM ON Loaded belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
E1	2.1	1.4	3.5	1.7	2.9	4.5	1.4	4.3	5.6
E2	2.1	2.4	4.4	1.7	4.7	6.4	1.4	7.1	8.5
E3	2.1	2.4	4.4	1.7	3.1	4.7	1.4	3.8	5.2
E4	9.4	28.5	38	6.3	24	30.4	3.3	19.6	22.9
E5	12.1	59.9	72	7.7	40.7	48.4	3.3	21.4	24.7
E6	9.4	22.3	31.7	6.3	19.8	26.1	3.3	17.1	20.5
E7	2.1	4.3	6.3	2.1	5.2	7.2	2.1	6.2	8.2
E8	2.1	6.2	8.2	2.3	6	8.3	2.6	5.8	8.4
E9	2.1	2.9	4.8	2.1	5.2	7.2	2.1	7.6	9.7
E10	2.1	4.7	6.8	1.4	2.4	3.7	0.7	0	0.7
E11	1.4	4.7	6.1	1	4.7	5.8	0.7	0	0.6
E12	2.1	1.4	3.5	1.4	0.7	2.1	0.7	0	0.7
G1	6.7	5.2	12	4.7	5.8	10.4	2.6	6.2	8.9
G2	5.4	8.1	13.5	3.7	6.2	9.9	2.1	4.3	6.3
G3	4	6.2	10.2	2.6	7.6	10.4	1.4	9.1	10.4
G4	13.5	23.8	37.3	8.4	16.7	25.1	3.3	9.5	12.9
G5	9.4	16.7	26	5.8	12.7	18.3	2.1	8.5	10.6
G6	4	6.7	10.7	3	7.1	10.1	2.1	7.6	9.7
G7	6.7	17.1	23.8	4.7	11.8	16.6	2.6	6.7	9.3
G8	5.4	17.1	22.5	3.7	12.7	16.3	2.1	8.1	10.1
G9	4	5.2	9.3	3	5.8	8.7	2.1	6.2	8.2



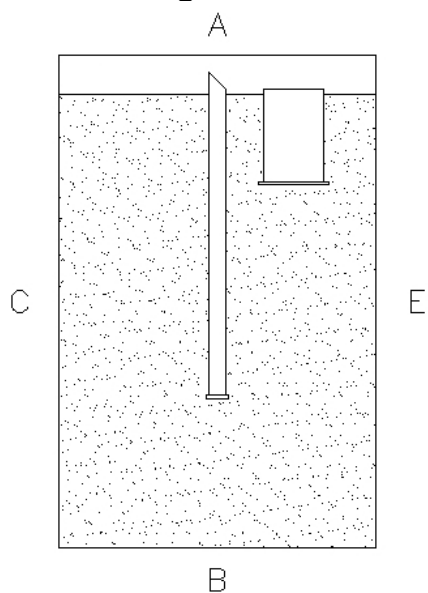
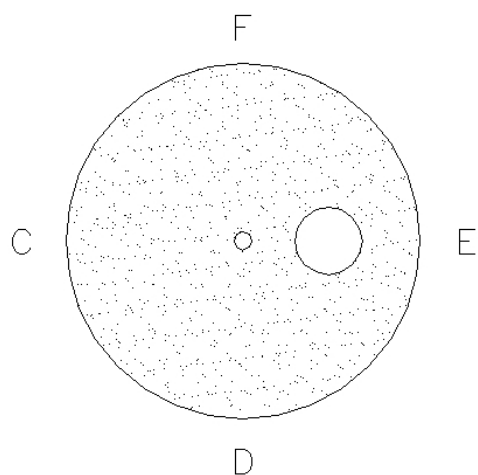
BOTTOM

BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
F1	2.9	10.2	12.8	4.8	10.2	15.8	4.9	12.3	18.1
F2	7.2	10	17.4	7	15.5	23.7	3.9	10.8	15.8
F3	4	10.4	14.6	4.1	9.1	13.2	4	11.8	16.4
F4	19.4	39.3	58.8	15.9	31.9	47.7	7.5	13.7	21
F5	41.9	87.3	129.1	24.7	48.4	73.1	6.6	15.2	21.7
F6	20.6	40.8	61.3	15.2	29.8	44.9	5.3	13.9	19.2
F7	3	9	12.7	5.5	8.2	14.8	5.5	13.2	18.9
F8	9	10.4	18.7	6.1	16.2	23	3.6	9.7	14.6
F9	3.9	8.5	13	5.2	8.7	15.1	4.3	13.7	17.6

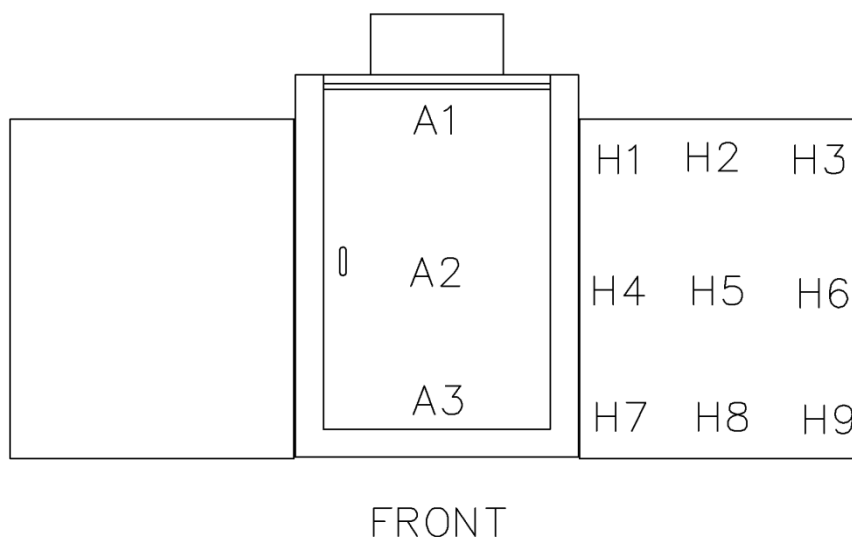
BEAM ON Loaded belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
F1	3.3	8.4	12.7	6.9	8.4	16	5.1	13.7	18.7
F2	9.1	10.9	20	7.9	13.3	21.2	2.8	10.7	14.6
F3	4.6	11.5	16.1	4.7	7.5	12	3.7	10.7	15.5
F4	18.1	35.1	53.1	16	29.1	45	6.3	11.7	18.1
F5	36.8	92.3	129.1	23.6	51.2	74.8	8.2	11.5	19.7
F6	18.6	41.9	60.5	17.4	28.2	45.7	6.8	14.1	20.9
F7	2.9	7.6	11.6	5.5	6.2	12.5	3.7	10.9	15.5
F8	7.8	11.4	18.9	6.8	15.4	22.7	4	8.5	12.9
F9	4.3	9	13.6	6.2	8.4	15.9	2.8	13.8	17.3

Source Storage Drum Front**Source Storage Drum Top****Source storage drum radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252**

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
A	38	28.8	67.9	21.9	16.1	38	10.4	11.5	21.9
B	362.3	370.3	732.6	93.2	177.1	270.3	28.8	38	66.7
C	322	322	644	107	201.3	308.2	27.6	41.4	69
D	322	354.2	676.2	100.1	209.3	309.4	26.5	44.9	71.3
E	322	241.5	563.5	104.7	144.9	249.6	23	44.9	67.9
F	322	289.8	611.8	112.7	193.2	305.9	28.8	36.8	65.6

Appendix F Radiation Survey With Automatic Source Drive Option

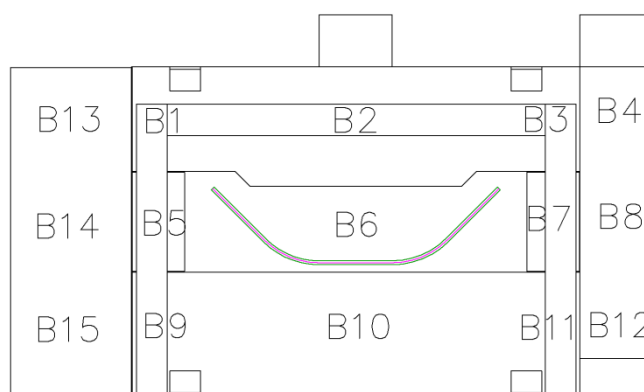


BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
A1	0.7	8.1	8.7	1	7.1	8.2	1.4	6.2	7.5
A2	1.4	7.1	8.5	1.4	6.4	7.8	1.4	5.8	7
A3	1.4	5.8	7	1	5.8	6.7	0.7	5.8	6.3
H1	7.4	15.4	22.9	4.4	12.1	16.4	1.4	8.5	9.9
H2	4.7	7.6	12.3	3	6.7	9.7	1.4	5.8	7
H3	3.3	10.9	14.3	2.3	7.4	9.8	1.4	3.8	5.2
H4	5.4	6.2	11.5	3.3	7.8	11.2	1.4	9.5	10.8
H5	4.7	6.7	11.4	3	5.2	8.3	1.4	3.8	5.2
H6	3.3	4.3	7.6	2.3	6	8.3	1.4	7.6	9
H7	2.6	4.3	7	2.3	6.7	9	2.1	9.1	11
H8	2.6	3.8	6.4	1.7	4.3	6	0.7	4.7	5.4
H9	2.6	4.3	7	2.1	4.3	6.3	1.4	4.3	5.6

BEAM OFF Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
A1	0.7	0	0.7	0.3	0	0.3	0	0	0
A2	0.7	0	0.7	0.5	0	0.5	0.2	0	0.2
A3	0	0	0	0.1	0	0.1	0.2	0	0.2
H1	1.4	0	1.4	1	0	1	0.7	0	0.7
H2	2.1	0	2.1	1.7	0	1.7	1.4	0	1.4
H3	1.4	0.5	1.8	1	0.2	1.3	0.7	0	0.7
H4	0.7	0.5	1.2	0.7	0.2	0.9	0.7	0	0.7
H5	1.4	0	1.4	1	0	1	0.7	0	0.7
H6	0.7	0.5	1.2	0.7	0.2	0.9	0.7	0	0.7
H7	0.7	0.5	1.2	0.3	0.2	0.6	0	0	0
H8	0.7	0	0.7	0.3	0	0.3	0	0	0
H9	0	0.5	0.5	0	0.2	0.2	0	0	0



LEFT SIDE

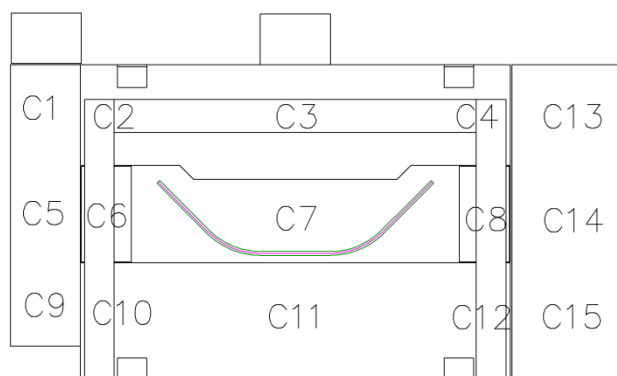
BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
B1	17.5	129.4	146.9	11.4	86.1	97.5	5.4	42.8	48.2
B2	21.5	231.2	252.7	14.1	144.1	158.2	6.7	57	63.8
B3	16.1	127	143.1	11	86.6	97.6	6.1	46.1	52.2
B4	1.4	19	20.4	2.8	21.3	26.3	1.5	18.2	19.7
B5	17.5	100.4	117.8	11	68.5	79.6	4.7	36.6	41.3
B6	24.2	163.2	187.3	15.1	102.7	117.9	6.1	42.3	48.4
B7	17.5	108	125.5	11.7	73.9	85.7	6.1	39.9	46
B8	3.3	15.6	19.1	3.7	17.4	21	3.1	15.4	18.5
B9	13.5	105.1	118.6	8.4	73.3	81.7	3.3	41.4	44.7
B10	16.1	131.3	147.4	10.1	90.6	100.6	4	49.9	53.9
B11	14.7	108	122.7	8.7	76.6	85.3	2.6	45.2	47.8
B12	2.1	4.3	6.3	2.5	4.8	7.4	2.2	4.1	6.3
B13	36.2	7.2	43.5	34.5	8.2	42.8	3.3	5.8	9.2
B14	23.8	6.9	30.7	20.9	4.8	25.9	3.9	6.2	10.1
B15	7.7	2.8	10.6	7.5	2.4	10	3.5	3.9	7.4

BEAM OFF Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
B1	45.7	7.1	52.8	25.9	4.7	30.6	6.1	2.4	8.4
B2	4.7	4.7	9.4	3.3	3.1	6.4	2.1	1.4	3.5
B3	2.6	2.9	5.5	2.1	2	3.9	1.4	0.9	2.3
B4	0.5	1.4	1.8	0.2	0.9	1.2	0	0.5	0.5
B5	45.7	10.9	56.6	25.5	7.1	32.7	5.4	3.3	8.7
B6	24.2	8.5	32.8	14.1	5.2	19.3	4	2	6
B7	4	4.7	8.7	3	2.6	5.6	2.1	0.5	2.5
B8	0.7	2	2.5	0.5	1.2	1.6	0.2	0.5	0.7
B9	53.7	18.1	71.8	30.2	11.2	41.4	6.7	4.3	11
B10	2.6	0.9	3.7	3	1.4	4.5	3.3	2	5.3
B11	0.7	0.9	1.6	1	1.2	2.2	1.4	1.4	2.8
B12	0.2	0.9	1.3	0.1	0.5	0.6	0	0	0
B13	1.4	2	3.2	1	2.2	3.1	0.7	2.4	3.1
B14	4	3.3	7.4	2.6	4.3	7	1.4	5.2	6.6
B15	9.4	4.3	13.7	5.4	3.8	9.2	1.4	3.3	4.7

Note: B1-11 points are at end of the tunnel extension. B1-3, B5-7 and B9-11 measurements were taken slightly inside tunnel extensions. B2, B6 and B10 are normally inaccessible.



RIGHT SIDE

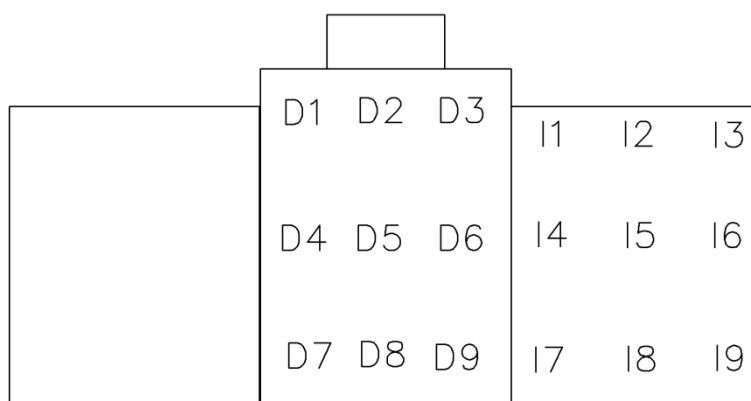
BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
C1	1.2	19.4	20.5	2.6	21.4	24	1.8	18.1	19.9
C2	16	127	142.9	11.2	86.7	97.9	5.6	46.1	51.8
C3	21	231.2	252.2	13.8	144.7	158.5	6.3	57.2	63.5
C4	17.8	129.5	147.3	11.4	86.5	97.9	5.8	42.7	48.4
C5	3.2	15.4	18.6	4.1	17.1	21.3	3.2	15.3	18.5
C6	17.7	107.9	125.7	12.2	73.8	86	5.6	40.4	46.1
C7	23.7	163.6	187.2	14.5	103	117.5	6.1	42.2	48.3
C8	17.5	99.9	117.4	11.3	68.4	79.7	4.7	36.1	40.8
C9	2.5	4.5	7	2.4	4.4	6.7	1.6	4.5	6.1
C10	15.1	108.2	123.3	8.7	76.2	85	2.6	45.7	48.3
C11	15.6	131.1	146.7	10.1	91	101.1	4.5	50.4	54.9
C12	13.1	105.2	118.3	7.8	73.3	81.1	3.6	41.9	45.4
C13	35.7	7	42.8	35	8.3	43.2	3.7	5.6	9.4
C14	24.3	6.7	30.9	21.4	4.4	25.8	4	6.1	10.1
C15	7.6	3.1	10.7	7.4	2.6	10	3.8	4.1	7.9

BEAM OFF Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
C1	0.9	1.4	2.3	0.1	1.3	1.4	0	0.9	0.9
C2	2.1	3.2	5.3	1.6	2.4	4	1.3	1	2.3
C3	4.6	4.9	9.5	3.9	3.3	7.2	1.8	1.6	3.5
C4	45.5	6.6	52.1	26.5	4.9	31.4	5.9	2.3	8.2
C5	0.5	1.7	2.2	0.8	0.7	1.5	0	0.9	0.9
C6	4.1	5.1	9.2	3	3.2	6.2	1.6	0.8	2.4
C7	23.8	8.3	32.1	13.7	5.5	19.2	3.8	2.4	6.2
C8	45.9	11.5	57.4	25.6	7.4	33	5.2	2.8	7.9
C9	0.5	1.4	1.8	0.3	0.8	1.2	0	0.6	0.6
C10	0.9	0.7	1.6	0.6	1.2	1.7	1.3	1.6	2.9
C11	2.2	0.5	2.6	3.3	1.2	4.5	3.5	2.4	5.9
C12	54.1	17.7	71.8	29.7	10.8	40.5	6.8	4.6	11.4
C13	1.2	2.4	3.6	0.7	2	2.6	1	2.6	3.7
C14	3.9	3.8	7.7	3.1	4.3	7.4	1.2	4.8	6
C15	9.1	4.7	13.8	5.9	3.5	9.3	1.7	3.5	5.2

Note: C2-12 points are at end of the tunnel extension. C2-4, C6-8 and C10-12 measurements were taken slightly inside tunnel extensions. C3, C7 and C11 are normally inaccessible.



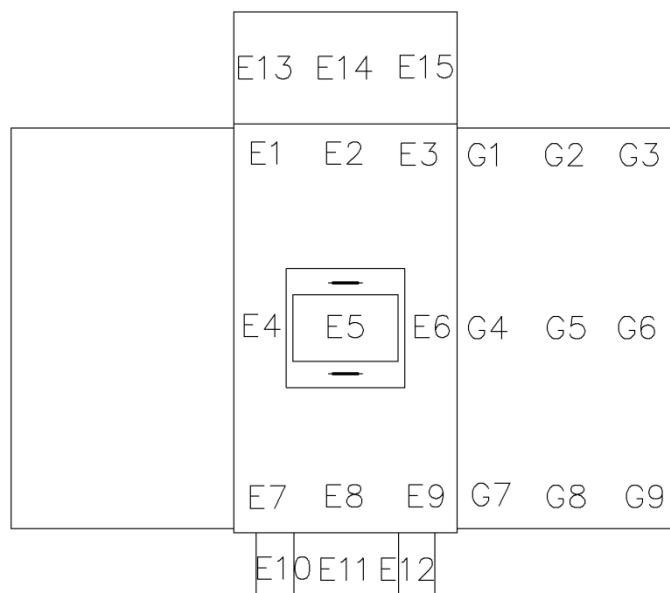
REAR (EXTRA SHIELDING BLOCK)

BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
D1	0	4.7	4.7	0	4.5	4.5	0	4.3	4.3
D2	0	2	2	0	4	4	0	6.2	6.2
D3	0	2	2	0	3.6	3.6	0	5.2	5.2
D4	0.7	2.4	3.1	0.7	3.6	4.3	0.7	4.7	5.4
D5	0.7	3.8	4.5	0.7	4.5	5.2	0.7	5.2	5.9
D6	0.7	4.3	4.9	0.7	4.5	5.2	0.7	4.7	5.4
D7	0	2	2	0.3	3.1	3.5	0.7	4.3	4.9
D8	0.7	1.4	2.1	0.7	2.2	2.8	0.7	2.9	3.6
D9	0	4.3	4.3	0	4.5	4.5	0	4.7	4.7

BEAM OFF Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
D1	0.7	0.9	1.6	0.7	0.5	1.2	0.7	0	0.7
D2	0.7	0	0.7	0.7	0	0.7	0.7	0	0.7
D3	0.7	0.5	1.2	0.7	0.2	0.9	0.7	0	0.7
D4	2.1	0.5	2.5	1.5	0.2	1.7	0.9	0	0.9
D5	3.3	0.9	4.3	2.2	0.5	2.6	0.9	0	0.9
D6	2.1	0	2.1	1.5	0	1.5	0.9	0	0.9
D7	3.3	0.5	3.8	2.3	0.2	2.5	1.4	0	1.4
D8	4	2.4	6.4	2.6	1.2	3.9	1.4	0	1.4
D9	3.3	0.9	4.3	2.3	0.5	2.9	1.4	0	1.4
I1	2.6	2.4	5.1	1.7	1.2	2.9	0.7	0	0.7
I2	1.4	0	1.4	1	0	1	0.7	0	0.7
I3	0.7	0.5	1.2	0.3	0.2	0.6	0	0	0
I4	10.7	5.2	16	6.3	2.9	9.2	2.1	0.5	2.5
I5	4	1.4	5.4	2.6	0.7	3.5	1.4	0	1.4
I6	1.4	0.5	1.8	1	0.2	1.3	0.7	0	0.7
I7	14.7	4.7	19.6	8.1	2.4	10.5	1.4	0	1.4
I8	4	1.4	5.4	2.3	0.7	3.1	0.7	0	0.7
I9	1.4	0.5	1.8	1	0.5	1.5	0.7	0.5	1.2



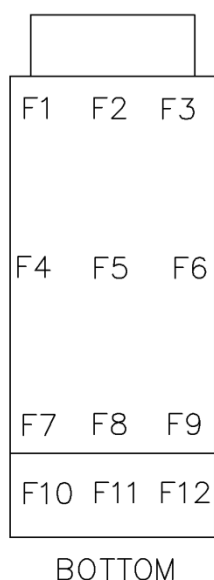
TOP

BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
E1	2.6	11.4	14.1	2.3	11.6	14	2.1	11.8	13.9
E2	2.6	6.2	8.9	2.6	9.8	12.4	2.6	13.3	16
E3	2.6	7.1	9.8	2.3	8.9	11.2	2.1	10.5	12.5
E4	10.7	48.5	59.2	10.7	39.4	50.3	10.7	30.5	41.2
E5	16.1	69	85.1	16.1	53.9	70.2	16.1	39	55.1
E6	10.7	51.4	62.1	10.7	43.2	54.1	10.7	35.2	45.9
E7	2.1	9.1	11	2.1	11.2	13.2	2.1	13.3	15.3
E8	2.1	9.5	11.5	2.1	13.1	15.1	2.1	16.7	18.6
E9	2.1	10.5	12.5	2.1	11.2	13.2	2.1	11.8	13.9
E10	1.4	6.7	8.1	1.4	8.3	9.7	1.4	10	11.4
E11	0.7	6.7	7.4	1	6.7	7.7	1.4	9.8	11.2
E12	1.4	6.7	8.1	1.4	8.3	9.7	1.4	10	11.4
E13	6.1	17.1	23.1	4	13.1	17.1	2.1	9.1	11
E14	6.1	15.6	21.7	4	13.1	17.1	2.1	10.5	12.5
E15	5.4	10.5	15.9	3.7	11.4	15.1	2.1	12.4	14.4
G1	17.5	50.9	68.3	10.4	40.7	51.1	3.3	30.5	33.8
G2	14.7	37.6	52.3	9.1	29.4	38.5	3.3	21.4	24.7
G3	6.7	17.6	24.3	5.1	18.1	23.1	3.3	18.5	21.9
G4	6.7	24.7	31.4	4.4	20	24.4	2.1	15.2	17.3
G5	8.1	19	27	5.1	16.4	21.4	2.1	13.8	15.8
G6	6.1	13.3	19.3	4	14.3	18.3	2.1	15.2	17.3
G7	2.6	11.4	14.1	2.3	11.6	14	2.1	11.8	13.9
G8	2.6	6.2	8.9	2.6	9.8	12.4	2.6	13.3	16
G9	2.6	7.1	9.8	2.3	8.9	11.2	2.1	10.5	12.5

BEAM OFF Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
E1	5.4	0.5	5.9	3.3	0.2	3.6	1.4	0	1.4
E2	5.8	0.5	6.2	3.9	0.9	4.8	2.1	1.4	3.5
E3	5.4	2	7.2	3.3	1.6	5.1	1.4	1.4	2.8
E4	2.1	0	2.1	1.7	0	1.7	1.4	0	1.4
E5	3.3	0	3.3	2.2	0	2.2	1	0	1
E6	2.1	0	2.1	1.7	0	1.7	1.4	0	1.4
E7	0.7	1.4	2.1	0.7	0.7	1.4	0.7	0	0.7
E8	0.7	0	0.7	0.7	0	0.7	0.7	0	0.7
E9	0.7	0.5	1.2	0.7	0.2	0.9	0.7	0	0.7
E10	0.2	0	0.2	0.3	0	0.3	0.5	0	0.5
E11	0.2	0	0.2	0.3	0	0.3	0.5	0	0.5
E12	0.2	0	0.2	0.3	0	0.3	0.5	0	0.5
E13	0.7	0	0.7	0.7	0	0.7	0.7	0	0.7
E14	0.7	0	0.7	0.7	0	0.7	0.7	0	0.7
E15	0.7	0	0.7	0.7	0	0.7	0.7	0	0.7
G1	6.1	0.9	7	3.2	0.5	3.7	0.5	0	0.5
G2	6.7	0	6.7	3.7	0	3.7	0.7	0	0.7
G3	2.1	0	2.1	1.4	0	1.4	0.7	0	0.7
G4	2.6	0	2.6	1.4	0.7	2.1	0	1.4	1.4
G5	2.6	0.5	3.1	1.4	0.5	1.8	0	0.5	0.5
G6	1.4	0	1.4	1	0.2	1.3	0.7	0.5	1.2
G7	0.7	0	0.7	0.6	0.2	0.8	0.5	0.5	0.9
G8	1.4	0	1.4	0.7	0.7	1.4	0	1.4	1.4
G9	0.7	0.5	1.2	0.3	0.2	0.6	0	0	0

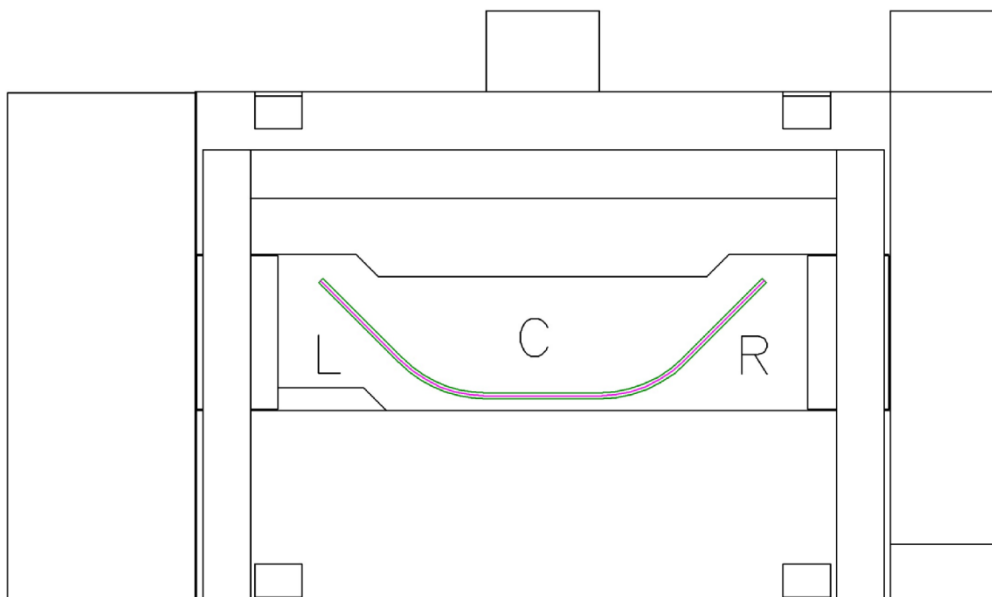
**BEAM ON Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252**

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
F1	2.9	10.2	12.8	4.8	10.2	15.8	4.9	12.3	18.1
F2	7.2	10	17.4	7	15.5	23.7	3.9	10.8	15.8
F3	4	10.4	14.6	4.1	9.1	13.2	4	11.8	16.4
F4	19.4	39.3	58.8	15.9	31.9	47.7	7.5	13.7	21
F5	41.9	87.3	129.1	24.7	48.4	73.1	6.6	15.2	21.7
F6	20.6	40.8	61.3	15.2	29.8	44.9	5.3	13.9	19.2
F7	3	9	12.7	5.5	8.2	14.8	5.5	13.2	18.9
F8	9	10.4	18.7	6.1	16.2	23	3.6	9.7	14.6
F9	3.9	8.5	13	5.2	8.7	15.1	4.3	13.7	17.6
F10	0.3	6.9	7.2	3.2	6.2	9.4	3.1	11.4	14.5
F11	6.9	8.2	15.1	3.6	13.9	17.5	0.7	6.9	7.6
F12	1.4	6.1	7.5	3.2	5.9	9.1	2.1	11.3	13.2

BEAM OFF Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

	5cm			30cm			100cm		
	Gamma	Neutron	Total	Gamma	Neutron	Total	Gamma	Neutron	Total
F1	0	3.2	3.2	1.4	6.8	8.2	3.9	9.5	13.5
F2	1.6	4.5	6.1	4.6	12.7	17.3	2.2	7.8	10
F3	0	3.3	3.3	1.3	6.1	7.5	2	8.9	10.8
F4	2.6	11	13.7	5.5	9.3	14.8	5.5	11.5	17
F5	8.9	10.6	19.3	7	16.1	23.1	3.9	11.5	15.4
F6	2.4	9.7	12.1	3.7	8.6	12.3	3.8	11.7	15.4
F7	20.8	39.8	60.6	17.3	32.4	49.7	5.9	14.3	20.1
F8	39.9	85.4	125.4	22.5	47.7	70.3	7.2	14.4	21.7
F9	20.4	39.2	59.7	16.3	30.4	46.7	7.5	13.3	20.7
F10	14.5	34.5	49	13.7	29	42.7	4.3	11.2	15.3
F11	34.3	78.7	112.9	20.8	47.3	68.1	5.1	12.8	17.8
F12	15.9	32.4	48.2	14.5	27.8	42.3	4.4	11.5	15.9

NOTE: These radiation levels are inside the tunnel extensions at the idlers closest to the On Belt Analyser-6 with the BEAM OFF.



BEAM OFF Empty belt radiation dose rates in $\mu\text{Sv/hr}$ for 57.5 μg of Cf-252

At Left, Centre and Right hand side rollers closest to On Belt Analyser-6

	Gamma	Neutron	Total
L	38.2	65.3	103.5
C	13.2	37	50.3
R	7.5	20.7	28.2