Rev.02 of June 16, 2002

Doses from the VT beam pipe

Here are given results of simulations of dose rate that results from activation of the beam pipe section placed inside the Thoroid (Zmin=870 cm, Zmax=1300 cm).

1. Both high-energy hadrons and low-energy neutrons activation was taken into account.
2. Design of the beam pipe section was taken from the LHCVC1T_0001 drawing. Geometry for activation calculations is given in the table 1. Material of the beam pipe section is 316 L (stainless steel). Total mass of stainless steel (316 L) is approximately 12.3 kg. Geometry for activation calculations is given in the table 1. A sketch of the beam pipe is given on fig. 1.
3. For the purpose of the study the beam pipe was subdivided onto a set of circular radiation sources centered along Z-axis and the dose was calculated as sum over all the sources. At that the doses will be conservative as no self-attenuation of gamma radiation was taken into account. Consequently doses may be slightly overestimated by some 10%.
4. In this study we use hadron flux on a fine grid ($\Delta R=0.1$ cm for $0<R<4$ cm and $\Delta R=1$ cm for $4<R$), which was produced by Mike Shupe. As usually, all the results are calculated for high luminosity 10^{34} cm^{-1} s^{-1}.
5. Results for VT beam-pipe are given in tables 2 (hadron activation) and 3 (neutron activation). All doses are in μSv/h. Dimensions are given in cm from the interaction point.

Table 1

Material zones of the VT beam pipe section

##	Z_{min}, cm	Z_{max}, cm	R_{min}, cm	R_{max}, cm	Mass, kg	Comment
1	870	871.4	2.9	4.3	0.346	Flange
2	871.4	1046.5	2.9	3	2.530	Tube
3	878.5	1039.3	3.9	4	3.111	Tube
4	1046.5	1050.7	3.5	3.6	0.073	Cone
5	1050.7	1298.5	4	4.1	4.916	Tube
6	1298.5	1300.7	4	6.3	1.276	Flange

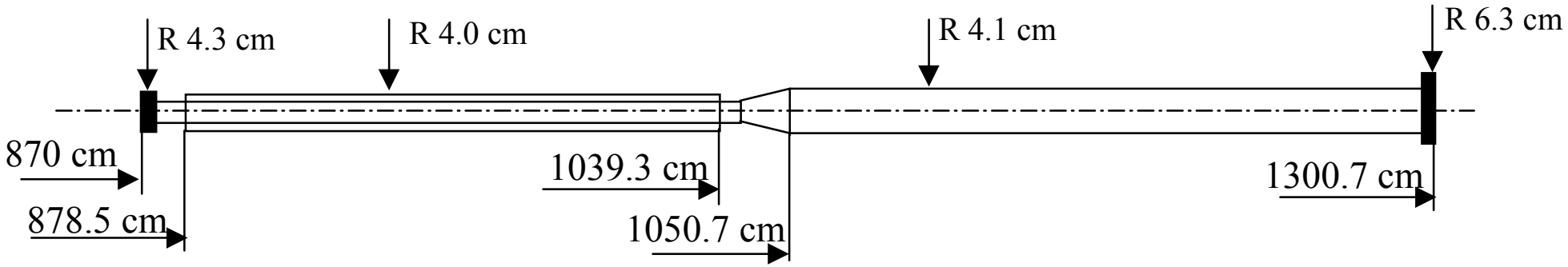

Fig. 1 Sketch of the VT Beam pipe section.

Table 2

Equivalent dose rate induced by high-energy hadrons from VT Beam Pipe for T= 100d, t=1d

R/Z, cm	860	870	880	920	960	1000	1040	1100	1150	1200	1250	1290	1300.7	1310
0	611	4157											1878	459
5	555	3884	2899	3069	3022	2878	1913	1032	918	815	765	1021	1783	414
7	510	1761	1808	1963	1940	1841	1274	640	565	503	471	699	1688	375
10	440	970	1155	1292	1283	1211	851	431	376	335	314	485	754	310
15	340	554	690	812	813	763	545	287	247	220	206	298	336	216
20	270	385	474	581	586	547	399	219	185	165	154	202	203	154
25	221	293	353	444	451	420	312	178	149	132	124	147	141	116
50	109	125	141	180	188	176	142	94	77	67	61	56	52	48
75	68	75	81	100	106	101	86	63	52	44	39	34	32	30
100	47	51	54	65	69	66	59	46	39	33	28	24	23	22
125	35	37	39	45	48	47	43	36	30	26	22	19	18	17
150	27	29	30	34	36	35	33	28	24	21	18	16	15	14
175	22	23	24	26	27	27	26	23	20	18	15	13	13	12
200	18	19	19	21	22	22	21	19	17	15	13	11	11	11
225	15	15	16	17	18	18	17	16	14	13	11	10	10	9

Table 2 (continuation)

Equivalent dose rate induced by high-energy hadrons from VT Beam Pipe for T= 100 d, t=5 d

R/Z, cm	860	870	880	920	960	1000	1040	1100	1150	1200	1250	1290	1300.7	1310
0	438	2980											1335	326
5	397	2784	2078	2198	2164	2061	1369	734	651	578	543	725	1268	294
7	366	1262	1296	1406	1389	1318	912	456	401	357	335	496	1200	267
10	315	696	828	926	919	867	609	307	267	238	223	344	536	220
15	244	397	494	582	582	546	390	204	175	156	146	212	239	153
20	193	276	340	416	420	391	285	156	132	117	110	143	144	110
25	158	210	253	318	323	301	223	127	106	94	88	104	100	83
50	78	90	101	129	135	126	102	67	55	47	43	40	37	34
75	49	54	58	72	76	72	62	45	37	32	28	24	23	21
100	34	36	39	46	49	47	42	33	28	24	20	17	16	16
125	25	27	28	32	34	34	31	25	22	18	16	14	13	12
150	20	21	21	24	25	25	24	20	17	15	13	11	11	10
175	16	16	17	19	20	20	19	16	14	13	11	9	9	9
200	13	13	14	15	16	16	15	14	12	11	9	8	8	8
225	11	11	11	12	13	13	12	11	10	9	8	7	7	7

Table 2 (continuation)

Equivalent dose rate induced by high-energy hadrons from VT Beam Pipe for T= 100 d, t=100 d

R/Z, cm	860	870	880	920	960	1000	1040	1100	1150	1200	1250	1290	1300.7	1310
0	76.2	517.2											227.5	55.6
5	69.1	482.9	362.2	382.1	375.7	357.5	235.2	124.5	109.4	96.1	91.2	122.5	216.3	50.1
7	63.5	219.2	225.9	244.4	241.1	228.5	156.8	77.4	67.3	59.4	56.1	84.0	205.1	45.4
10	54.8	120.9	144.3	160.9	159.5	150.3	104.8	52.1	44.9	39.7	37.4	58.4	91.4	37.5
15	42.4	69.1	86.1	101.2	101.1	94.6	67.2	34.8	29.5	26.1	24.6	35.9	40.7	26.1
20	33.6	48.0	59.1	72.3	72.8	67.8	49.1	26.5	22.2	19.6	18.4	24.3	24.5	18.7
25	27.5	36.5	44.0	55.3	56.1	52.1	38.5	21.6	17.9	15.7	14.8	17.7	17.0	14.1
50	13.5	15.6	17.5	22.4	23.4	21.8	17.5	11.5	9.3	8.0	7.3	6.8	6.3	5.8
75	8.5	9.3	10.1	12.5	13.2	12.5	10.6	7.7	6.3	5.4	4.7	4.1	3.8	3.6
100	5.9	6.3	6.7	8.0	8.5	8.2	7.3	5.7	4.7	4.0	3.4	2.9	2.8	2.7
125	4.4	4.6	4.9	5.6	6.0	5.8	5.3	4.4	3.7	3.2	2.7	2.3	2.2	2.1
150	3.4	3.6	3.7	4.2	4.4	4.3	4.1	3.5	3.0	2.6	2.2	1.9	1.8	1.7
175	2.7	2.8	2.9	3.2	3.4	3.4	3.2	2.8	2.5	2.1	1.8	1.6	1.5	1.5
200	2.2	2.3	2.4	2.6	2.7	2.7	2.6	2.3	2.1	1.8	1.6	1.4	1.3	1.3
225	1.9	1.9	2.0	2.1	2.2	2.2	2.1	2.0	1.8	1.6	1.4	1.2	1.2	1.1

Table 2 (continuation)

Equivalent dose rate induced by high-energy hadrons from VT Beam Pipe for T= 10 y, t=1 d

R/Z, cm	860	870	880	920	960	1000	1040	1100	1150	1200	1250	1290	1300.7	1310
0	667	4530											2052	502
5	605	4232	3162	3351	3300	3140	2086	1125	1000	889	834	1116	1949	452
7	556	1919	1972	2143	2118	2008	1390	698	615	548	514	764	1845	410
10	479	1058	1260	1411	1401	1322	928	470	410	366	342	530	824	338
15	371	605	753	887	888	832	595	313	269	240	225	326	367	236
20	294	420	517	634	640	597	435	238	202	180	168	220	221	169
25	241	319	385	485	493	458	340	194	162	144	135	160	154	127
50	119	137	154	197	206	192	155	103	84	73	66	61	57	53
75	74	82	89	110	116	110	94	69	56	48	43	37	35	33
100	52	56	59	71	75	72	64	51	42	36	31	27	25	24
125	39	41	43	50	52	51	47	39	33	28	24	21	20	19
150	30	31	33	37	39	38	36	31	27	23	20	17	16	16
175	24	25	26	29	30	30	28	25	22	19	16	14	14	13
200	20	20	21	23	24	24	23	21	18	16	14	12	12	12
225	16	17	17	19	19	19	19	17	16	14	12	11	10	10

Table 2 (continuation)

Equivalent dose rate induced by high-energy hadrons from VT Beam Pipe for T= 10 y, t=5 d

R/Z, cm	860	870	880	920	960	1000	1040	1100	1150	1200	1250	1290	1300.7	1310
0	493	3349											1503	367
5	447	3129	2337	2472	2433	2318	1539	829	735	652	613	817	1427	331
7	411	1419	1457	1581	1562	1482	1025	514	453	402	378	560	1352	300
10	354	782	931	1041	1033	975	685	346	301	268	252	388	603	248
15	274	447	556	654	655	614	439	231	198	176	165	239	269	173
20	217	310	382	468	472	440	321	176	148	132	124	161	162	124
25	178	236	285	358	363	338	251	143	119	106	99	118	113	93
50	88	101	113	145	152	141	114	76	62	53	49	45	42	39
75	55	60	65	81	86	81	69	51	42	36	31	27	25	24
100	38	41	44	52	55	53	48	37	31	26	23	20	18	18
125	28	30	32	37	39	38	35	29	24	21	18	15	14	14
150	22	23	24	27	29	28	27	23	20	17	14	13	12	11
175	18	18	19	21	22	22	21	18	16	14	12	11	10	10
200	14	15	15	17	18	18	17	15	14	12	10	9	9	8
225	12	12	13	14	14	14	14	13	12	10	9	8	8	7

Table 2 (continuation)

Equivalent dose rate induced by high-energy hadrons from VT Beam Pipe for T= 10y, t=100d

R/Z, cm	860	870	880	920	960	1000	1040	1100	1150	1200	1250	1290	1300.7	1310
0	114.5	777.3											346.0	84.6
5	103.8	725.7	544.4	575.0	565.3	538.2	355.1	189.9	167.4	147.5	139.6	187.2	328.9	76.3
7	95.5	329.4	339.5	367.8	362.8	344.0	236.6	117.9	103.1	91.0	85.9	128.3	311.7	69.2
10	82.4	181.7	216.9	242.2	240.1	226.3	158.1	79.4	68.7	60.8	57.3	89.1	139.1	57.1
15	63.7	103.9	129.5	152.3	152.2	142.4	101.4	53.0	45.1	39.9	37.6	54.8	61.9	39.7
20	50.6	72.2	88.9	108.9	109.6	102.1	74.1	40.3	33.9	29.9	28.2	37.0	37.3	28.4
25	41.4	54.9	66.2	83.2	84.5	78.4	58.1	32.8	27.3	24.0	22.6	27.0	25.9	21.4
50	20.4	23.5	26.4	33.8	35.3	32.8	26.4	17.4	14.1	12.2	11.1	10.3	9.6	8.9
75	12.7	14.0	15.2	18.8	19.9	18.8	16.1	11.7	9.5	8.2	7.2	6.2	5.8	5.5
100	8.9	9.5	10.2	12.1	12.8	12.4	11.0	8.6	7.1	6.1	5.2	4.5	4.2	4.0
125	6.6	7.0	7.3	8.5	9.0	8.8	8.0	6.6	5.6	4.8	4.1	3.5	3.3	3.2
150	5.1	5.4	5.6	6.3	6.6	6.6	6.1	5.3	4.5	3.9	3.3	2.9	2.7	2.6
175	4.1	4.3	4.4	4.9	5.1	5.1	4.9	4.3	3.7	3.2	2.8	2.4	2.3	2.3
200	3.4	3.5	3.6	3.9	4.1	4.1	3.9	3.5	3.1	2.8	2.4	2.1	2.0	2.0
225	2.8	2.9	3.0	3.2	3.3	3.3	3.2	3.0	2.7	2.4	2.1	1.8	1.8	1.7

Table 3

Equivalent dose rate induced by low-energy neutrons from VT Beam Pipe for T= 100 d, t= 1 d

R/Z, cm	860	870	880	920	960	1000	1040	1100	1150	1200	1250	1290	1300.7	1310
0	8.90	58.87											39.11	9.64
5	8.07	60.74	41.06	46.47	45.25	41.50	22.41	15.82	13.69	11.59	10.43	17.92	38.43	8.69
7	7.42	26.11	25.59	29.23	28.60	26.18	15.47	9.78	8.43	7.17	6.53	12.86	37.75	7.86
10	6.39	14.10	16.49	19.10	18.79	17.16	10.70	6.55	5.61	4.80	4.44	9.15	16.35	6.45
15	4.93	8.01	9.94	11.94	11.84	10.78	7.12	4.33	3.68	3.16	2.99	5.64	6.94	4.40
20	3.91	5.57	6.86	8.51	8.50	7.73	5.32	3.27	2.76	2.38	2.28	3.76	4.03	3.07
25	3.20	4.24	5.12	6.49	6.54	5.94	4.23	2.64	2.21	1.92	1.85	2.69	2.72	2.26
50	1.58	1.82	2.05	2.62	2.72	2.50	1.99	1.37	1.13	0.99	0.94	0.96	0.91	0.85
75	0.99	1.09	1.18	1.46	1.53	1.44	1.23	0.92	0.76	0.66	0.61	0.56	0.53	0.50
100	0.69	0.74	0.79	0.94	0.99	0.95	0.85	0.67	0.57	0.49	0.44	0.39	0.37	0.35
125	0.51	0.54	0.57	0.66	0.69	0.68	0.62	0.52	0.44	0.39	0.34	0.30	0.28	0.27
150	0.40	0.41	0.43	0.49	0.51	0.51	0.48	0.41	0.36	0.31	0.27	0.24	0.23	0.22
175	0.32	0.33	0.34	0.38	0.40	0.39	0.38	0.33	0.30	0.26	0.23	0.20	0.19	0.19
200	0.26	0.27	0.28	0.30	0.32	0.32	0.31	0.28	0.25	0.22	0.19	0.17	0.17	0.16
225	0.22	0.22	0.23	0.25	0.26	0.26	0.25	0.23	0.21	0.19	0.17	0.15	0.14	0.14

Table 3 (continuation)

Equivalent dose rate induced by low-energy neutrons from VT Beam Pipe for T= 100 d, t=5 d

R/Z, cm	860	870	880	920	960	1000	1040	1100	1150	1200	1250	1290	1300.7	1310
0	8.52	56.35											37.27	9.19
5	7.72	58.13	39.31	44.47	43.31	39.71	21.45	15.12	13.08	11.07	9.95	17.08	36.62	8.28
7	7.10	24.99	24.50	27.97	27.37	25.05	14.80	9.34	8.05	6.84	6.23	12.25	35.97	7.50
10	6.11	13.50	15.78	18.28	17.98	16.42	10.24	6.25	5.36	4.58	4.23	8.72	15.58	6.14
15	4.72	7.67	9.51	11.43	11.33	10.32	6.81	4.14	3.51	3.02	2.85	5.38	6.62	4.19
20	3.74	5.33	6.56	8.15	8.14	7.40	5.09	3.12	2.63	2.28	2.18	3.59	3.84	2.93
25	3.06	4.05	4.90	6.22	6.26	5.68	4.05	2.53	2.12	1.83	1.77	2.57	2.59	2.15
50	1.51	1.74	1.96	2.51	2.60	2.39	1.91	1.31	1.08	0.94	0.90	0.92	0.87	0.81
75	0.94	1.04	1.13	1.39	1.47	1.38	1.17	0.88	0.73	0.63	0.58	0.53	0.50	0.48
100	0.66	0.71	0.75	0.90	0.95	0.91	0.81	0.64	0.54	0.47	0.42	0.37	0.35	0.34
125	0.49	0.52	0.54	0.63	0.66	0.65	0.59	0.50	0.43	0.37	0.32	0.28	0.27	0.26
150	0.38	0.40	0.41	0.47	0.49	0.49	0.46	0.39	0.34	0.30	0.26	0.23	0.22	0.21
175	0.30	0.32	0.33	0.36	0.38	0.38	0.36	0.32	0.28	0.25	0.22	0.19	0.18	0.18
200	0.25	0.26	0.26	0.29	0.30	0.30	0.29	0.26	0.24	0.21	0.19	0.16	0.16	0.15
225	0.21	0.21	0.22	0.24	0.25	0.25	0.24	0.22	0.20	0.18	0.16	0.14	0.14	0.13

Table 3 (continuation)

Equivalent dose rate induced by low-energy neutrons from VT Beam Pipe for T= 100 d, t= 100 d

R/Z, cm	860	870	880	920	960	1000	1040	1100	1150	1200	1250	1290	1300.7	1310
0	3.73	24.66											16.52	4.07
5	3.38	25.44	17.21	19.49	18.98	17.41	9.40	6.62	5.73	4.86	4.39	7.57	16.24	3.67
7	3.11	10.94	10.73	12.26	12.00	10.98	6.49	4.09	3.53	3.00	2.75	5.43	15.95	3.32
10	2.68	5.91	6.91	8.01	7.88	7.20	4.49	2.74	2.35	2.01	1.87	3.86	6.91	2.72
15	2.07	3.36	4.16	5.01	4.97	4.52	2.99	1.81	1.54	1.33	1.26	2.38	2.93	1.86
20	1.64	2.33	2.87	3.57	3.57	3.24	2.23	1.37	1.15	1.00	0.96	1.59	1.70	1.30
25	1.34	1.78	2.15	2.72	2.74	2.49	1.77	1.11	0.93	0.80	0.78	1.14	1.15	0.95
50	0.66	0.76	0.86	1.10	1.14	1.05	0.84	0.58	0.48	0.41	0.40	0.41	0.38	0.36
75	0.41	0.46	0.49	0.61	0.64	0.60	0.51	0.39	0.32	0.28	0.26	0.23	0.22	0.21
100	0.29	0.31	0.33	0.39	0.41	0.40	0.35	0.28	0.24	0.21	0.18	0.16	0.16	0.15
125	0.21	0.23	0.24	0.28	0.29	0.28	0.26	0.22	0.19	0.16	0.14	0.13	0.12	0.12
150	0.17	0.17	0.18	0.20	0.22	0.21	0.20	0.17	0.15	0.13	0.12	0.10	0.10	0.09
175	0.13	0.14	0.14	0.16	0.17	0.17	0.16	0.14	0.12	0.11	0.10	0.08	0.08	0.08
200	0.11	0.11	0.12	0.13	0.13	0.13	0.13	0.12	0.10	0.09	0.08	0.07	0.07	0.07
225	0.09	0.09	0.10	0.10	0.11	0.11	0.11	0.10	0.09	0.08	0.07	0.06	0.06	0.06

Table 3 (continuation)

Equivalent dose rate induced by low-energy neutrons from VT Beam Pipe for T= 10 y, t= 1 d

R/Z, cm	860	870	880	920	960	1000	1040	1100	1150	1200	1250	1290	1300.7	1310
0	11.74	77.53											54.89	13.54
5	10.64	80.19	54.06	61.54	59.90	55.01	29.72	21.33	18.47	15.82	14.45	25.23	54.00	12.21
7	9.79	34.44	33.71	38.69	37.85	34.71	20.53	13.18	11.37	9.78	9.05	18.08	53.10	11.04
10	8.43	18.59	21.74	25.28	24.87	22.75	14.22	8.82	7.57	6.54	6.15	12.86	22.99	9.05
15	6.51	10.57	13.11	15.80	15.67	14.30	9.47	5.83	4.96	4.31	4.13	7.92	9.75	6.17
20	5.16	7.35	9.05	11.26	11.26	10.25	7.08	4.40	3.72	3.24	3.15	5.27	5.66	4.31
25	4.22	5.59	6.76	8.59	8.66	7.88	5.63	3.56	2.99	2.61	2.56	3.77	3.81	3.16
50	2.09	2.40	2.71	3.47	3.60	3.31	2.65	1.84	1.53	1.34	1.29	1.34	1.27	1.18
75	1.31	1.44	1.56	1.93	2.03	1.91	1.63	1.23	1.03	0.90	0.83	0.77	0.73	0.69
100	0.91	0.98	1.04	1.24	1.31	1.26	1.13	0.90	0.76	0.67	0.60	0.53	0.51	0.49
125	0.68	0.72	0.75	0.87	0.92	0.90	0.83	0.69	0.60	0.52	0.46	0.41	0.39	0.37
150	0.53	0.55	0.57	0.65	0.68	0.68	0.64	0.55	0.48	0.43	0.37	0.33	0.31	0.30
175	0.42	0.44	0.45	0.50	0.53	0.53	0.50	0.45	0.40	0.35	0.31	0.27	0.26	0.26
200	0.35	0.36	0.37	0.40	0.42	0.42	0.41	0.37	0.33	0.30	0.26	0.23	0.23	0.22
225	0.29	0.30	0.30	0.33	0.34	0.35	0.34	0.31	0.28	0.26	0.23	0.20	0.20	0.19

Table 3 (continuation)

Equivalent dose rate induced by low-energy neutrons from VT Beam Pipe for T= 10 y, t= 5 d

R/Z, cm	860	870	880	920	960	1000	1040	1100	1150	1200	1250	1290	1300.7	1310
0	11.31	74.68											52.83	13.03
5	10.25	77.24	52.08	59.28	57.69	52.98	28.62	20.54	17.78	15.23	13.91	24.28	51.97	11.75
7	9.43	33.17	32.47	37.27	36.46	33.43	19.78	12.69	10.95	9.41	8.71	17.40	51.10	10.63
10	8.12	17.91	20.94	24.35	23.95	21.91	13.69	8.50	7.29	6.30	5.92	12.38	22.13	8.71
15	6.27	10.18	12.63	15.22	15.10	13.77	9.12	5.61	4.78	4.15	3.98	7.63	9.39	5.94
20	4.97	7.08	8.72	10.85	10.84	9.88	6.82	4.24	3.58	3.12	3.04	5.08	5.44	4.15
25	4.07	5.39	6.51	8.28	8.34	7.59	5.42	3.42	2.88	2.51	2.47	3.63	3.67	3.04
50	2.01	2.32	2.61	3.34	3.47	3.19	2.55	1.78	1.47	1.29	1.25	1.29	1.22	1.14
75	1.26	1.38	1.50	1.86	1.96	1.84	1.57	1.19	0.99	0.87	0.80	0.74	0.70	0.66
100	0.88	0.94	1.00	1.19	1.26	1.22	1.09	0.87	0.74	0.64	0.58	0.51	0.49	0.47
125	0.65	0.69	0.73	0.84	0.89	0.87	0.80	0.67	0.58	0.50	0.44	0.39	0.37	0.36
150	0.51	0.53	0.55	0.62	0.66	0.65	0.61	0.53	0.47	0.41	0.36	0.32	0.30	0.29
175	0.41	0.42	0.44	0.48	0.51	0.51	0.48	0.43	0.38	0.34	0.30	0.26	0.25	0.25
200	0.33	0.34	0.35	0.39	0.40	0.41	0.39	0.36	0.32	0.29	0.25	0.23	0.22	0.21
225	0.28	0.29	0.29	0.32	0.33	0.33	0.32	0.30	0.27	0.25	0.22	0.20	0.19	0.18

Table 3 (continuation)

Equivalent dose rate induced by low-energy neutrons from VT Beam Pipe for T= 10y, t=100d

R/Z, cm	860	870	880	920	960	1000	1040	1100	1150	1200	1250	1290	1300.7	1310
0	5.69	37.51											28.42	7.01
5	5.16	38.91	26.16	29.97	29.15	26.82	14.49	10.58	9.17	7.95	7.38	13.10	27.99	6.32
7	4.74	16.69	16.32	18.83	18.42	16.92	10.02	6.54	5.64	4.91	4.62	9.38	27.55	5.72
10	4.08	9.01	10.53	12.30	12.10	11.09	6.95	4.38	3.76	3.28	3.14	6.67	11.92	4.69
15	3.16	5.12	6.36	7.69	7.63	6.97	4.63	2.89	2.46	2.16	2.11	4.10	5.05	3.20
20	2.50	3.56	4.39	5.48	5.48	5.00	3.47	2.18	1.85	1.63	1.61	2.73	2.93	2.23
25	2.05	2.71	3.28	4.18	4.22	3.84	2.76	1.76	1.48	1.31	1.31	1.95	1.97	1.63
50	1.01	1.17	1.32	1.69	1.76	1.62	1.30	0.91	0.76	0.67	0.66	0.68	0.65	0.60
75	0.64	0.70	0.76	0.94	0.99	0.93	0.80	0.61	0.51	0.45	0.42	0.39	0.37	0.35
100	0.44	0.48	0.51	0.60	0.64	0.62	0.55	0.45	0.38	0.33	0.30	0.27	0.26	0.25
125	0.33	0.35	0.37	0.42	0.45	0.44	0.41	0.34	0.30	0.26	0.23	0.20	0.20	0.19
150	0.26	0.27	0.28	0.32	0.33	0.33	0.31	0.27	0.24	0.21	0.19	0.16	0.16	0.15
175	0.21	0.21	0.22	0.25	0.26	0.26	0.25	0.22	0.20	0.18	0.15	0.14	0.13	0.13
200	0.17	0.17	0.18	0.20	0.21	0.21	0.20	0.18	0.17	0.15	0.13	0.12	0.11	0.11
225	0.14	0.15	0.15	0.16	0.17	0.17	0.17	0.15	0.14	0.13	0.11	0.10	0.10	0.10