M.N.Morev, 17 May 2002

Here are given results of activation intercomparison in iron and aluminum for short cooling time, (namely t=1 d). Different assumptions for irradiation time T were taken -- 30d, 100d, and 10y. For T=10 y three cases were calculated – ten irradiation periods with T_i=120 d (t_i= 245 d), T_i=180 d (t_i= 185 d), and T_i=365 d (t_i= 0 d).
Results of simulations in terms of specific Gamma-equivalent are given in Table 1. Total Gamma-equivalent and Gamma-equivalent of dominant radionuclide are presented for the both materials. Methods for estimation and other assumptions are the same as in the previous note of May 15.

Table 1

Specific Gamma-equivalents, $(Sv.m^2)/(cm^3.s)$

Material	Nuclide	T=30 d	T=100 d	T=10y (T_i=120d)	T=10y (T_i=180d)	T=10 y (T_i=365 d)
Al	Na-24	2.49E-14	2.49E-14	2.49E-14	2.49E-14	2.49E-14
	tot	2.65E-14	2.99E-14	4.85E-14	5.95E-14	9.05E-14
Fe	Mn-52	5.40E-13	5.60E-13	5.60E-13	5.60E-13	5.60E-13
	tot	7.20E-13	8.10E-13	8.40E-13	8.70E-13	9.20E-13

Table 2

Omega factors, $(Sv/h)/(Stars.cm^{-3}.s^{-1})$

Material	Author	T=30 d	T=100 d	T=10y (Ti=120d)	T=10y (Ti=180d)	T=10 y
Al	Morev	3.72E-09	4.20E-09	6.81E-09	8.35E-09	1.27E-08
	Huntinen	4.70E-09	-	-	-	1.60E-08
Fe	Morev	1.25E-08	1.41E-08	1.46E-08	1.51E-08	1.60E-08
	Huntinen	4.00E-09	-	-	-	8.20E-09

One can see from the Table 2, that Morev and Huntinen have quite similar results for Al activation. The difference of about 30% may be explained by either different spectra (Mika used real specter, Morev used E_p=600 MeV) or cross-sections (Morev use protons cross-section for pions – for very high energies it produce conservative estimation).
Morev's results in Fe are 3 times above for T=30 d and 2 times above for T=10y.
So, I conclude that disagreement in Fe/Al ratio for short cooling time results from disagreement in Fe activation, and first of all in Mn^{52} cross-section. In my cross-section library I have only Mn^{52m+g} cross-section and no data on branching ratio for ground and isomer production, consequently I used an ultimately conservative assumption as if the both nuclides are produced independently with branching ratio 1.0 (Mika used 0.5). In addition, the cross-section itself seems to be overestimated by a factor of 2 (the reaction is not very good measured and I used calculated data; all available experimental points lay beneath the calculated curve). An overestimation of Mn^{52} cross-section by factor of 4 may explain the disagreement. Since Mn^{52} half decay is 5.6 days, the difference in omega factors for t=5-7 days will be less evident.