LETTER TO THE EDITOR

COMMENTS ON "ANALYSIS OF ^{60}Co GAMMA-RAY TRANSPORT THROUGH AIR BY DISCRETE-ORDINATES CODES"

In Ref. 1 Sasamoto and Takeuchi reported on the application of the discrete ordinates transport codes DOT-III and PALLAS-2DCY to determine the radiation field from ^{60}Co point sources in the air aboveground. In the comparison with experimental data,[2] some discrepancies remained unresolved. Recently, a paper on "air-ground interface correction factors for gamma emitters in air"[3] was published. In Ref. 3 it was pointed out that the radiation field is most strongly influenced by the interface for source energies around 100 keV, suggesting a test of the discrete ordinates transport codes in this energy range.

A contribution to the resolution of the discrepancies between the results of the discrete ordinates transport codes and the experiments is given in Table I by a comparison with Monte Carlo results of Ref. 3. The air/ground interface correction factor C defined by the ratio of the kerma at 1 m aboveground and of the kerma in infinite air for the same source-detector distance has been included. For small lateral distances, the experiment may have been disturbed by the container for the gamma source. The corresponding results have been put in parentheses in Table I. For all other lateral distances, the expermental data and Monte Carlo results agree within 10%. The PALLAS code seems to overestimate the kerma at 1 m aboveground. DOT-III has the same problems for elevated sources but seems to work well for sources near the ground. Note that the discrepancies between the results of the discrete ordinates method and the experimental data (supported by the Monte Carlo method) is of the same order of magnitude as the interface effect.

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REFERENCES

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2. F. F. HAYWOOD, J. A. AUXIER, and E. T. LAY, "An Experimental Investigation of the Spatial Distribution of Dose in an Air-over-Ground Geometry," CEX-62.14, U.S. Atomic Energy Commission (1964).

3. P. JACOB and H. G. PARETZKE, *Health Phys.*, **48**, 183 (1985).

TABLE I

Comparison of Some Results for Exposure Rates from ^{60}Co Point Sources Aboveground

H_s (m)	R_s (m)	C[3]	$4\pi R_s^2 \cdot \dot{X}$ ($m^2 \cdot R/h \cdot 800\ Ci^{-1}\ ^{60}Co$)			Ratios of Exposure Rates	
			PALLAS	Experiment[2]	Monte Carlo[3]	Experiment/ Monte Carlo	PALLAS/ Monte Carlo
8.23	121	0.97	108	(139)	104	(1.34)	1.04
8.23	215	0.84	81.9	78.5	72.6	1.08	1.13
8.23	370	0.69	48.9	39.5	37.8	1.04	1.29
8.23	458	0.63	35.1	27.5	25.4	1.08	1.38
8.23	680	0.55	13.5	8.9	9.3	0.96	1.45
343	400	1.02	53.2	(39.0)	50.2	(0.78)	1.06
343	500	0.98	40.9	31.4	33.7	0.93	1.21
343	600	0.94	21.2	26.5	22.0	0.96	1.20
343	774	0.87	11.9	9.9	9.9	1.00	1.20