

## R-I1

### IAEA - 307 : A New Biological Reference Material for Marine Environmental Radioactivity Studies

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A laboratory intercomparison exercise to determine the levels of natural and artificial radionuclides in a homogenized sample of sea plant (*Posidonia oceanica*) was organized by the International Laboratory of Marine Radioactivity (IAEA) in 1988-1989. The sea plants were collected along the shore from the vicinity of Monaco in October 1986 and were assumed to be contaminated by both global and close-in radioactive fallout from the accident of Chernobyl (26 April 1986).

TABLE 1

Reference activity values :

Radionuclide	Recommended value <sup>1</sup> Bq kg <sup>-1</sup>	Confidence interval Bq kg <sup>-1</sup> ( $\alpha=0.05$ )
Potassium-40	150	141-161
Ruthenium-106	33.5	30.0-36.5
Silver-110m	5.1	4.8-5.5
Caesium-134	1.6	1.5-1.9
Caesium-137	4.9	4.5-5.2
Radium-226	3.1	2.1-4.4
Plutonium-238	0.025	0.022-0.028
Plutonium-239,240	0.72	0.66-0.79
Americium-241 <sup>2</sup>	0.036	0.030-0.050

- Activities are expressed on dry-weight basis (constant weight at 80°C) for the reference date : 1 January 1988.
- Recommended value for reference date only. Ingrowth from any <sup>241</sup>Pu present will alter value if <sup>241</sup>Am is measured in the sample during some subsequent year.

Sixty-six laboratories from 31 member state countries reported results for 34 natural and man-made radionuclides in this reference material (IAEA-307). The large participation made it possible to generate statistically valid recommended values for the activities of 9 radionuclides in this material (Table 1). Non-certified information values were generated for 4 radionuclides (Table 2). This reference material IAEA-307 was certified as a reference material from this exercise and made available for distribution in 1990.

TABLE 2

Non-certified activity values :

Radionuclide	Activity <sup>1</sup> Bq kg <sup>-1</sup>	Confidence interval Bq kg <sup>-1</sup> ( $\alpha=0.05$ )
Strontium-90	0.72	0.28-1.6
Lead-210	58.5	40-91
Thorium-228	3.2	1.5-4.2
Uranium-238	14	2.5-21

- Activities are expressed on dry-weight basis for the reference date : 1 January 1988.

Recommended concentrations represent overall median values calculated from the results that passed a non-parametric test that identified outliers (1) and which satisfied a number of other selected quality criteria (2). Confidence intervals were calculated from statistical tables and correspond to a significance level of 0.05.

The total number of outliers from the 415 reported results was small (about 8% of all results) and varied between 0 and 3 per laboratory. Twenty laboratories submitted results that included at least one outlying value.

The reference material IAEA-307 is certified for use to evaluate the accuracy of radioanalytical procedures for biological materials, and when checking precision among analysts in a laboratory.

#### REFERENCES

- A. Veglia : International Atomic Energy Agency, Report No. IAEA/RL/84 (August 1981)
- A. Veglia, S. Ballestra, D. Vas : Report on the Intercomparison of IAEA-307, Radionuclides in Sea Plant, Report No. IAEA/AL/014 (October 1989)