EXERCISE 2: Evaluation of Concentrations Predicted by Models

Aim

To compare the activity concentrations derived from media to biota transfer for the radioecological components of the models under evaluation. To evaluate the underpinning assumptions that may be used in the different models if any activity concentrations are significantly different.

Description

Participants use their models to determine the whole body fresh weight activity concentrations of 18 radionuclides in seven terrestrial and twelve aquatic reference organisms (see Tables 1 and 2). These have been selected on the basis of common radionuclides and reference organisms between the models although it is likely that results will not be returned for all combinations for every model.

Proposed models

RESRAD-BIOTA England & Wales Environment Agency ERICA-FASSET ECOMOD Atomic Energy Canada Ltd. approach OURSON (freshwater only) Potential other contributors from Canada – to be confirmed Linda Kumblad model SKB – to be confirmed

Method

1)	Input parameters are 1 Bq kg ⁻¹ (Soil) 1 Bq l ⁻¹ (Water) Bq m ⁻³ (Air ³ H &
	14 C). (NB – input parameter for C-14 and H-3 may vary)
2)	

2) Results should be reported for the radionuclides listed in Table 1.

Table 1: Radionuclides for use in Exercise 2

H-3	Ra-226	U-234
I-129	Sr-90	U-235
I-131	Tc-99	U-238
Po-210	Th-232	
Pu-239	Th-234	
	I-129 I-131 Po-210	

Results should be reported for the terrestrial reference organisms listed in Table 2 as whole body activity concentration (Bqkg⁻¹ fresh weight).

4) Results should be reported for the terrestrial reference organisms listed in Table 3 as whole body activity concentration (Bqkg⁻¹ fresh weight).

Table 2:	Terrestrial Reference Organisms	Table 3:	Freshwater Reference Organisms
Earthworm	(elongated)	Duck	
Shrub		Frog/amp	hibian
Herb		Pelagic fis	sh
Herbivorous	Mammal	Fish egg	
Carnivorous	Mammal	Macrophy	te (vascular plant)
Rodent		Phytoplan	kton
Bird egg		Zooplankt	on
		Benthic M	lollusc
		Small Ber	nthic Crustacean

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Large Benthic Crustacean Benthic Fish Aquatic mammal Biota Dosimetry Working Group, IAEA Programme on Environmental Modelling for RAdiation Safety (EMRAS)

- 5) Participants are advised that where they do not have a particular reference organism that they should follow their normal procedure for undertaking the assessment. For example, if you would not report it then do not, if you then make appropriate assumptions do so but list the assumptions made in the results spreadsheet (Table 5).
- 6) With the reference organisms if the participant needs to specify a real species to aid the calculations, the participant needs to note which species they have used under each reference organism category, as appropriate.
- 7) If, for the purposes of calculating the activity concentrations in different reference organisms, you need time spent in different environmental compartments then use the occupancy factors specified in Table 4.

Table 4:If required, use the following occupancy factor data for selected
reference organisms

			Benthic		
Organism	Underground	Shore	interface	Water	Air
Duck		0.50		0.25	0.25
Frog		0.50		0.50	
Fish egg			1.00		
Pelagic Fish			0.10	0.90	
Benthic Fish Aquatic			0.90	0.10	
Mammal		0.20	0.20	0.60	

	Underground	Soil surface	
Rodent Herbivorous	0.7 ^A	0.30	0.00
Mammal Carnivorous	0.50 ^	0.50	0.00
Mammal Earthworm	0.40 ^A	0.60	0.00
(elongated) ^A Assume burro	0.9^{A} wing depth of 25	0.10 cm	0.00

Output

The output is fresh weight activity concentration (Bqkg⁻¹) in the different reference organisms and the results should be presented in the results spreadsheet. An example of the format is given in Table 5.

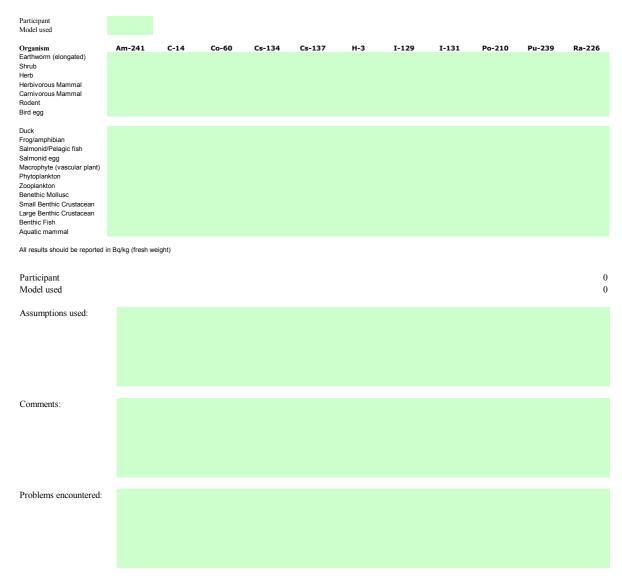


Table 5: Results output structure

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Participant Model used																		
Organism Earthworm (elongated) Shrub Herb Herbivorous Mammal Camivorous Mammal Rodent Bird egg	Am-241	C-14	Co-60	Cs-134	Cs-137	с. Т	I-129	I-131	Po-210	Pu-239	Ra-226	Sr-90	1c-99	Th-232	Th-234	U-234	U-235	U-238
Duck Frogramphiban Salmonid/Pelagic fish Salmonid/Pelagic fish Macrophyte (vascular plant) Phytoptankton Zooplankton Zooplankton Small Benthic Crustacean Benthic Fish Large Benthic Crustacean Benthic Fish																		

All results should be reported in Bq/kg (fresh weight)