

Centre for Ecology & Hydrology

Update on the derivation of the final CR data tables

N Beresford



Centre for Ecology & Hydrology NATURAL ENVIRONMENT RESEARCH COUNCIL

Database evolution





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ERICA database

What's in it?



Elements

- Radionuclides to cover expected EIA scenarios, e.g. sources
 - TENORM
 - Routine release (reprocessing, power production)
 - accidents
 - High level waste repository
- 31 radioelements (46 radioisotopes)

Eleme

- Radionuclides to cover expension cover expension
 - TENORM
 - Routine release (reprocessi production)
 - accidents
 - High level waste repository
- 31 radioelements (46 radiois

Silver Ag Americium Am С Carbon Cd Cadmium Ce Cerium CI Chlorine Cm Curium Cobalt Caesium Europium Η Tritium lodine Mn Mangenese Nb Niobium Nickel Np Neptunium Ρ Phosphorus Pb Lead Po Polonium Pu Plutonium Ra Radium Ru Ruthenium Sulphur Sb Antimony Se Selenium Strontium Sr Tc Technetium Te Tellurium Th Thorium Uranium U Zirconium



Organisms

Selection criteria, reference
organism list should encompass:
Organisms likely to have
comparatively high exposures

- Radiosensitive organisms
- Protected species
- Range of trophic levels
- Easy to sample



Organisms

	1	-	
ПЛ	2	rn	no.
	aı		10

Phytoplankton Macroalgae Vascular plant Zooplankton Polychaete worm **Bivalve mollusc** Crustacean Benthic fish Pelagic fish (Wading) bird Mammal Reptile Sea anemones/true corals **Freshwater**

Phytoplankton Vascular plant Zooplankton Insect larvae Bi-valve mollusc Gastropod Crustacean Benthic fish Pelagic fish Bird Mammal Amphibian **Terrestrial** Grasses & Herbs Shrub Tree Lichen & bryophyte Soil invertebrate (worm) Gastropod Flying insect Mammal (deer) Mammal (rat) Bird Bird egg Amphibian Reptile



Database evolution



.... SENES, WSC, NRPA, KAERI, UoB



International	Atomic Energy Agency &	Non-Human Species Transfer Parameter Database
International	Non-Human Species Transfer Parameter Database - Microsoft Internet Explorer	
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ICRP RAP Frog	ICRP-38	
Lifestage None 💌	Done	Nuclide Ac 💌

http://www.wildlifetransferdatabase.org/









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Table of Contents	Wildlife Transfer Database <u>http://www.wildlifetransferdatabase.org/</u>	
Expand all Collapse all	NOTE: November 2010 - The database is currently off-line whilst the website it is hosted on undergoes maintenance. If during this period you wish to add data please contact Nick Beresfo	rd or <u>David Copplestone</u> .
 <u>Training courses - schedule & details</u> <u>Ask a question</u> 	A number of evaluations of the available approaches to estimating the exposure of wildlife to ionising radiation have concluded that the estimation of wholebody activity concentrations (using transfer models the dose rate predictions (for instance see outputs of the IAEA EMRAS Biota Working Group and the EC funded PROTECT consortium).) contributes most to the overall uncertainty of
Questions & Answers Radiological Environmental Protection Assessment tools PEICA Tool	Acting on such findings the IAEA EMRAS II programmes Working Group 5 is working to collate data on the transfer of radionuclides to wildlife to support the production of a Technical Report Series handbo Working Group is using an online database (click to access) to collate and summarise data. The database has been designed and supported by the: Environment Agency, England and Wales; Centre for E Radiation Protection Authority; Natural Environment Research Council (UK).	iok. In collaboration with the IUR, the EMRAS II Ecology and Hydrology (UK); Norwegian
RESRAD-BIOTA	Your assistance in populating the database with any suitable data on concentration ratios that you may have would be welcomed.	-
SADA Marine dynamic model	Once you have registered to use the database, there is a help/guidance document available which explains what information is being requested how to navigate within the website and complete the database to modify the design of the website (for example, we know that the view summary pages are currently not working correctly).	e fields. Please note that we will be continuing
	The help file to the online database can be accessed here. The help file is regularly updated, version 1.11 (17/01/2011) is the current version.	
REB wildlife transfer issue	How to categorise freshwater fish species by feeding strategy and as ICRP RAPS (contains information for all species included into the database). Version 22nd July 2010.	
Tissue to Wholebody Conversion EC EURATOM projects	How to <u>categorise terrestrial species by database wildife group and as ICRP RAPS</u> (underdevelopment). Version 22nd November 2010. A useful link for confirming/finding scientific names ca <u>Gateway</u> . Type species name into search box (can be common name) and on the results page select <u>Taxonomic information for Scientific Name</u> .	n be found on the <u>National Biodiversity</u>
	How to categorise ICRP RAPS- contains some useful links.	
Workshop reports	How to convert tissue specific activity concentrations to wholebody values.	
Refereed papers	Questions and answers with regard to using the database and processing input data can be found here.	
ERICA reports	We advise that you use Internet Explorer to access the database.	
	If you have any queries on how to use the database or find any problems with it please contact either <u>Nick Beresford</u> or <u>David Cooplestone</u> .	
E FASSET	Please forward the website details on to anyone else you think might have suitable data.	
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P7 Added by <u>Nicholas Beresford</u> . last edited by <u>Nicholas Beresfor</u>	rd on Jan 17, 2011 (view change)		
Table of Contents	Wildlife Transfer Database http://www.wildlifetransferdat	abase.org/	
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ERICA papers	If you have any queries on how to use the database or find any	p 3 This list will be extend as additional species are added to the database (try http://www.fishbase.org/Summary if you need	information on a species not listed)
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ERICA database review

- Started with ERICA databases for generic freshwater, marine and terrestrial ecosystems:
 - Re-categorised to 'IAEA' wildlife groupings and subcategories and also by ICRP RAP
 - QC:
 - marine resulted in some reductions in data (tissue specific data)

 freshwater - identified that considerable number of values originated from review publications

 freshwater - some instances where tissue specific data and not wholebody had been used



New data treatment

www.ceh.ac.uk/protect

• Yankovich et al. (2010) used to convert tissue to wholebody data (for new entries) if information not available in source



New data treatment File Edit View Eavorite

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New data treatment

- Yankovich et al. (2010) used to convert tissue to wholebody data (for new entries) if information not available in source
- QC on entry, exclude if unclear:
 - DW or FW, tissue or wholebody, co-location of biota and water ...
 - Duplicate data
 - Laboratory data (other than for freshwater algae, phyto/zoo-plankton, sea anemone)



Data entries

In total approximately 50,000 entries comprising 87,000 CR_{wo} values from 520 sources:

Ecosystem	Entries	Values
Estuarine (water)	3259	4190
Estuarine (terrestrial)	119	141
Freshwater CR _{wo-water}	30825 10441	42878 16814
Marine	3441	10229
Terrestrial	12276	29848



- There is bias in some datasets, e.g.
 - Lots of data from Canada for freshwaters
 - All terrestrial Tc data from UK sand dunes
 - Terrestrial bird/mammal Pu/Am signif. amount of data from Chernobyl zone
 - Estuarine is either Baltic or Japanese estuaries



Derivation of values in tables





Derivation of values in tables

- Weighted arithmetic means and SD calculated (i.e. taking into account 'n' for each entry)
- Geometric means and GSD approximated from the arithmetic values
- Minimum and maximum <u>entry</u> reported together with N
 - the min. and max. may be for individual samples or may be for a mean value (with associated SD)



GM v's minimum

In some instances GM < minimum





Wildlife subcategories

- In addition wildlife group values for CR_{wo} for subcategories have been presented where possible
 - Sub-category not considered for inclusion if the number of data were <10
 - Number of references also taken into account
- Major wildlife group data include subcategory data
- Some instances where one sub-category contributes all the data for a wildlife group
 Identified in tables



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Wildlife subcategories

DRAFT-DO NOT QUOTE OR USE VALUES

Vanadium (V)								
Lichens and bryophytes	2.0E-01	2.9E-01	1.1E-01	2.9E+00	2.2E-02	1.2E+00	32	348,355
Shrub	4.7E-02	6.9E-02	2.6E-02	2.9E+00	7.5E-03	3.4E-01	64	347, 348
Tungsten (W)								
Tree - coniferous*	4.7E-01						1	467
Ytterbium (Yb)								
Grasses and herbs	5.7E-03	8.5E-03	3.1E-03	3.0E+00	2.6E-04	7.5E-03	4	467
Lichens and bryophytes	9.8E-03	1.2E-02	6.3E-03	2.6E+00	3.3E-03	3.1E-02	5	467
Shrub	8.4E-03	3.4E-03	7.8E-03	1.5E+00	6.0E-03	1.0E-02	5	467
Tree - coniferous*	3.2E-03						2	467
Zinc (Zn)								
Annelid	4.0E+00	1.6E+00	3.7E+00	1.5E+00	1.9E+00	7.0E+00	383	344
Arthropod	1.1E+00	6.1E-01	9.7E-01	1.7E+00	3.0E-01	3.6E+00	257	344
Arthropod - Detritivorous	1.7E+00	1.2E+00	1.4E+00	1.9E+00	3.0E-01	3.6E+00	38	344
Grasses and herbs	1.8E+00	2.8E+00	9.6E-01	3.1E+00	1.8E-02	8.7E+00	12	334,467
Lichens and bryophytes	1.8E+00	1.7E+00	1.3E+00	2.2E+00	2.9E-02	7.6E+00	100	334, 342, 345, 348, 355, 467
Reptile - Camivorous*	2.0E-01	3.9E-01	9.2E-02	3.5E+00	1.6E-01	2.4E-01	30	487
Shrub	4.5E+00	3.5E+00	3.5E+00	2.0E+00	4.0E-02	1.6E+01	250	342, 345, 347, 348, 467
Tree	3.1E-02	2.0E-02	2.6E-02	1.8E+00	8.4E-03	4.7E-02	4	467
Zirconium (Zr)								
Shrub	9.4E-05	8.1E-05	7.2E-05	2.1E+00			64	249

*All data for wildlife group are for subcategory presented; + not included in the mammal wildlife group value

- Identified in tables

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What's not presented

- No CR_{wo-sed} values virtually only Canadian fish data & not (to our knowledge) being routinely used
- New wildlife groups where very little data entered – fungi, fern
- Any consideration of habitat sub-category (e.g. freshwater-flowing, freshwater-lake)

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ICRP RAP Frog		
Lifestage None 💌		Nuclide Ac
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http://www.wildlifetransferdatabase.org/