Transfer of radionuclides to wildlife within the ICRP system of protection

Panel Discussion

Joint IES-ICRP Symposium
Aomori, Japan, October 4, 2016

David Copplestone
Secretary, ICRP Committee 5
Planned, emergency, and existing exposure situations

Environmental radionuclide concentrations

Reference Male & Female, Representative Person

Reference Animals and Plants

Dose limits, constraints and reference levels

Derived Consideration Reference Levels

Decisions regarding protection of public health and the environment for the same exposure situation
<table>
<thead>
<tr>
<th>WILDLIFE GROUP</th>
<th>RAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large terrestrial mammals</td>
<td>Deer</td>
</tr>
<tr>
<td>Small terrestrial mammals</td>
<td>Rat</td>
</tr>
<tr>
<td>Aquatic birds</td>
<td>Duck</td>
</tr>
<tr>
<td>Amphibians</td>
<td>Frog</td>
</tr>
<tr>
<td>Freshwater pelagic fish</td>
<td>Trout</td>
</tr>
<tr>
<td>Marine fish</td>
<td>Flatfish</td>
</tr>
<tr>
<td>Terrestrial insects</td>
<td>Bee</td>
</tr>
<tr>
<td>Marine crustaceans</td>
<td>Crab</td>
</tr>
<tr>
<td>Terrestrial annelids</td>
<td>Earthworm</td>
</tr>
<tr>
<td>Large terrestrial plants</td>
<td>Pine tree</td>
</tr>
<tr>
<td>Small terrestrial plants</td>
<td>Wild grass</td>
</tr>
<tr>
<td>Seaweeds</td>
<td>Brown seaweed</td>
</tr>
</tbody>
</table>
Table 1.1. Elements and their radioisotopes considered in this report.

<table>
<thead>
<tr>
<th>Element</th>
<th>Isotopes</th>
</tr>
</thead>
</table>
| Ag      | Silver  
Am        | Americium  
Ba        | Barium  
C         | Carbon  
Ca       | Calcium  
Cd       | Cadmium  
Ce       | Cerium  
Cf       | Californium  
Cl       | Chlorine  
Cm       | Curium  
Co       | Cobalt  
Cr       | Chromium  
Cs       | Caesium  
Eu       | Europium  
H        | Tritium  
I        | Iodine  
Ir       | Iridium  
K        | Potassium  
La       | Lanthanum  
Mn       | Manganese  
Nb       | Niobium  
Ni       | Nickel  
Np       | Neptunium  
P        | Phosphorus  
Pa       | Protactinium  
Pb       | Lead  
Po       | Polonium  
Pu       | Plutonium  
Ra       | Radium  
Ru       | Ruthenium  
S        | Sulphur  
Sb       | Antimony  
Se       | Selenium  
Sr       | Strontium  
Tc       | Technetium  
Te       | Tellurium  
Th       | Thorium  
U        | Uranium  
Zn       | Zinc  
Zr       | Zirconium  |
|---------|-----------------------------|
|         | Ag-110m  
Am-241  
Ba-140  
C-14  
Ca-45  
Cd-109  
Ce-141, Ce-144  
Cf-252  
Cl-36  
Cm-242, Cm-243, Cm-244  
Co-57, Co-58, Co-60  
Cr-51  
Cs-134, Cs-135, Cs-136, Cs-137  
Eu-152, Eu-154  
H-3  
I-125, I-129, I-131, I-132, I-133  
Ir-192  
K-40  
La-140  
Mn-54  
Nb-94, Nb-95  
Ni-59, Ni-65  
Np-237  
P-32, P-33  
Pa-231  
Pb-210  
Po-210  
Pu-238, Pu-239, Pu-240, Pu-241  
Ra-226, Ra-228  
Ru-103, Ru-106  
S-35  
Sb-124, Sb-125  
Se-75, Se-79  
Sr-89, Sr-90  
Tc-99  
Te-129m, Te-132  
Th-227, Th-228, Th-230, Th-231, Th-232, Th-234  
U-234, U-235, U-238  
Zn-65  
Zr-95  |
Options

- Concentration ratios (biota/media – air, water, soil, sediment etc.)
- Allometry/biological scaling
- Guidance
Wildlife Transfer Database

International Atomic Energy Agency & International Union of Radioecologists

If you are not registered, Register Now
If you have forgotten your login details please email us and we will send you a reminder (Password Reminder)

User Name
Password

This database collates data to provide parameter values for use in environmental radiological assessments to estimate the transfer of radioactivity to wildlife. The database has been updated today (12/12/13). Full details of the update will be made available soon. There may be some minor changes with the data over the next few weeks as further evaluation of the changed data takes place. If you have any queries please contact us at the wildlife.transfer@gmail.com address. We will note here when the database update is complete.

The database was started to aid both:
1) the International Atomic Energy Agency (IAEA) in the production of a handbook on wildlife transfer parameters (IAEA Technical Report Series now in press); and
2) the derivation of transfer parameter values for the International Commission on Radiological Protection (ICRP) list of Reference Animals and Plants (RAPs) (ICRP Publication 114).

The database has been designed and supported by the following organisations:
- Environment Agency, England and Wales
- Norwegian Radiation Protection Authority, Norway
- Centre for Ecology and Hydrology, NERC, UK
- University of Stirling, UK
- The STAR Radioecology Network of Excellence
### ICRP 108

<table>
<thead>
<tr>
<th>WILDLIFE GROUP</th>
<th>RAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large terrestrial mammals</td>
<td>Deer</td>
</tr>
<tr>
<td>Small terrestrial mammals</td>
<td>Rat</td>
</tr>
<tr>
<td>Aquatic birds</td>
<td>Duck</td>
</tr>
<tr>
<td>Amphibians</td>
<td>Frog</td>
</tr>
<tr>
<td>Freshwater pelagic fish</td>
<td>Trout</td>
</tr>
<tr>
<td>Marine fish</td>
<td>Flatfish</td>
</tr>
<tr>
<td>Terrestrial insects</td>
<td>Bee</td>
</tr>
<tr>
<td>Marine crustaceans</td>
<td>Crab</td>
</tr>
<tr>
<td>Terrestrial annelids</td>
<td>Earthworm</td>
</tr>
<tr>
<td>Large terrestrial plants</td>
<td>Pine tree</td>
</tr>
<tr>
<td>Small terrestrial plants</td>
<td>Wild grass</td>
</tr>
<tr>
<td>Seaweeds</td>
<td>Brown seaweed</td>
</tr>
</tbody>
</table>

Family level so some have a few, some lots of species

Where no data, used wildlife group from database
Guidance

- Use an available CR value for an organism of similar taxonomy within a given ecosystem for the radionuclide under assessment (preferred option)

- Use an available CR value for a similar Reference Organism within a given ecosystem for the radionuclide under assessment (preferred option)

- Use an available CR value for the given Reference Organism for an element of similar biogeochemistry. Use an available CR value for biogeochemically similar elements for organisms of similar taxonomy

- Use an available CR value for biogeochemically similar elements available for a similar Reference Organism

- Use allometric relationships, or other modelling approaches, to derive appropriate CRs. Assume the highest available CR (least preferred option)

- Use the CR for the same organism in a different ecosystem (least preferred option).