WG-8 Biota modelling: Further development of transfer and exposure models and application to scenarios
Activities agreed Nov. 2012

• Modelling exposure in spatially heterogeneous environments
• Simple whole-organism ellipsoid geometries v’s Voxel phantoms
• Develop scenario for Fukushima marine environment
• Collate biological half-life data for wildlife
• ‘Lessons learnt’ documentation
Address the uncertainty in biota modelling results (indicated in EMRAS), and build more confidence in simple modelling approaches as used for regulatory purposes.
Modelling spatially heterogeneous environments

• Typically simplistic
  – Point of capture media concentrations
  – Average over likely home-range

• Is that good enough?
Progress

- Review of approaches used in other fields
- Various data sets proposed
Planned activities

• Swedish moose GPS tracking study
  – Data originators willing to work with us and have experience of Tools

• In future consider using trapping/GPS-collaring/TLD study in Chernobyl zone

• Compare spatial-behavioural model packages with simple assumptions
Dosimetry Progress

Compared dose rates from:

- Ellipsoidal whole-body dose * organ mass ratio
- Voxel approach:
  - detailed organ geometries
  - organs are both targets and emission sources
• Results generally agree <OoM for a range of radionuclides.

• Ellipsoidal approach is conservative when using real-world marine fish data ($^{137}$Cs, $^{90}$Sr, and $^{239+240}$Pu), more so for gamma emitters.

• When real-world fish GI tract is included (often a source of elevated activity concentrations), the increase in whole-body dose is minimal (<factor of 5)

• Results provide more confidence (to practitioners, regulators, public) when faced with questions about simplified models.
Dynamic models

• Models assume equilibrium
  – Is it conservative?
  – Not suitable for modelling pulsed releases
Fukushima scenario

• Water & sediment inputs supplied by WG10 (predictions to end July 2011)
  – Cs-137, Sr-90, I-131

• Results submitted by 7 modellers
  – Including one set from ERICA (equilibrium) for comparison
Fukushima scenario

• Methods presented & limited INITIAL comparison
• Timetable set to QC results (End Jan)
• Evaluation of outputs at mid-term
  – Generate actions to understand differences
Biological half-lives for wildlife

- Reviews of freshwater and marine organisms approaching complete
- Terrestrial – ongoing
- Completed and QC’ed by Nov. 2014
- Publish dataset with DOI and associated data paper
‘Lessons learnt’ document

- Introduction (to set context) by mid-term
- Capabilities of openly available models
  - Tabulated draft by mid-term
- How you ‘make’ model do what you need
- Parameter values
- Dosimetry
- Coping with heterogeneous media distributions
- Radionuclide specific issues