Beaverlodge scenario – R&D128

David Copplestone

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R&D128 Input

Nuclide	Water conc. Bq m^{-3}	Sediment m^3 kg^{-1}	Concentration factors, organism:w Bacteria m^3 kg^{-1}	Phytoplankton m^3 kg^{-1}	Zooplankton m^3 kg^{-1}
^{3}H					
^{14}C					
^{32}P					
^{60}Co					
^{90}Sr					
^{99}Tc					
^{106}Ru					
^{125}I					
^{129}I					
^{131}I					
^{137}Cs	2.00E+01	4.1E+00		1.8E-01	2.0E-02
^{210}Po	7.50E+00	1.1E+01		6.0E+00	6.0E+00
^{234}Th					
^{238}U	1.53E+01	5.5E+00		4.0E-03	1.0E-03
^{239}Pu	6.50E+00	1.3E+00		1.8E-01	2.0E-02
^{241}Am					

Limited selection of radionuclides – so used analogues

Reference organisms – selected analogues

Converted water concentrations from Bq/l

Default concentration factors

Environment Agency

Analogue radionuclides

- Selected analogues for based on decay type and half-life, using method in EA Habitats Reports
  - Pb-210 (Cs-137 – other beta gamma, half life > 10 days)
  - Ra-226 (Pu-239 – other alpha)
  - Th-230 (Pu-239 – other alpha)

Analogue organisms

- Selected based on biology

for variation

Beaverlodge	Dimensions (mm)	Mass (kg)	R&D128	Dimensions (mm)	Mass (kg)
White Sucker	450 x 15 x 10	1.19E+00	Pelgaic fish	450 x 87 x 49	1.00E+00
Lake whitefish	436 x 14 x 10	1.36E+00	Benthic fish	450 x 87 x 49	1.00E+00
Chironomus riparius	0.34 x 0.17 x 0.15	1.20E-07	Phytoplankton	0.05 x 0.05 x 0.05	6.50E-11
Pisidium sp.	5 x 1.5 x 1	9.00E-07	Small benthic crustacea	6.2 x 3.1 x 1.6	1.60E-05

- Phytoplankton selected for Chironomus based on dimensions - no biologically similar surrogate
  - Alternative reference organism would be small benthic crustacea or zooplankton (which have same size & mass)

Calculation

Activity concentration in biota (Bq kg^{-1}) = activity concentration in water (Bq m^{-3}) * default R&D128 concentration factor (m^3 kg^{-1})

Site 13 - Dubyna Lake (shallow)

- No analytical data available for activity concentration in water
- Used sediment concentration factor to convert activity in sediment to activity in water

$$\text{activity concentration in water } (Bq\ m^{-3}) = \frac{\text{activity concentration in sediment } (Bq\ kg^{-1})}{\text{sediment concentration factor } (m^3\ kg^{-1})}$$