User guide for dynamic assessment model

Certificate No 13950

Certificate No 66423

User guide for dynamic assessment model

The data to be assembled will depend on whether the calculation is to be done prospectively, based on predicted radionuclide concentrations in the environment (calculated from assumed rates of discharge over an extended period of time) or retrospectively, based on measured concentrations of radionuclides in the environment.

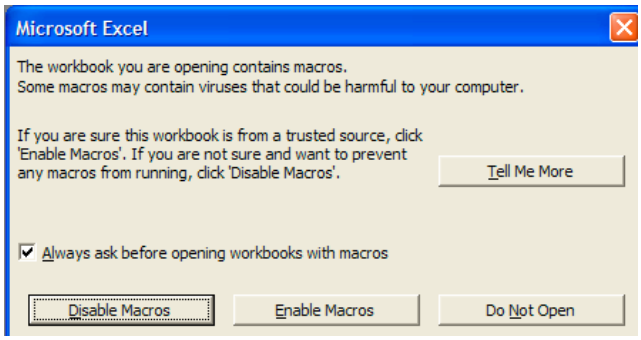
The data required are:

- Concentrations of radionuclides in the dissolved phase (filtrate) of the water column (Bq m^{-3}).
- Concentrations of the radionuclides in underwater sediment (Bq kg^{-1} dry weight) (although the model can predict these from dissolved phase concentrations using default K_d values if so required).

Concentrations should be averaged temporally on a time scale of either days, months or years.

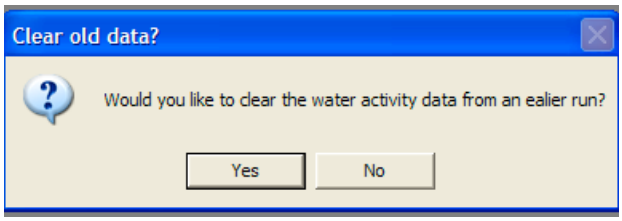
Procedure for running an assessment

1) Double-click to open the spreadsheet *Dynamic tool release version 1_15.xls*.
2) Upon presentation of the screen below click "enable macros".

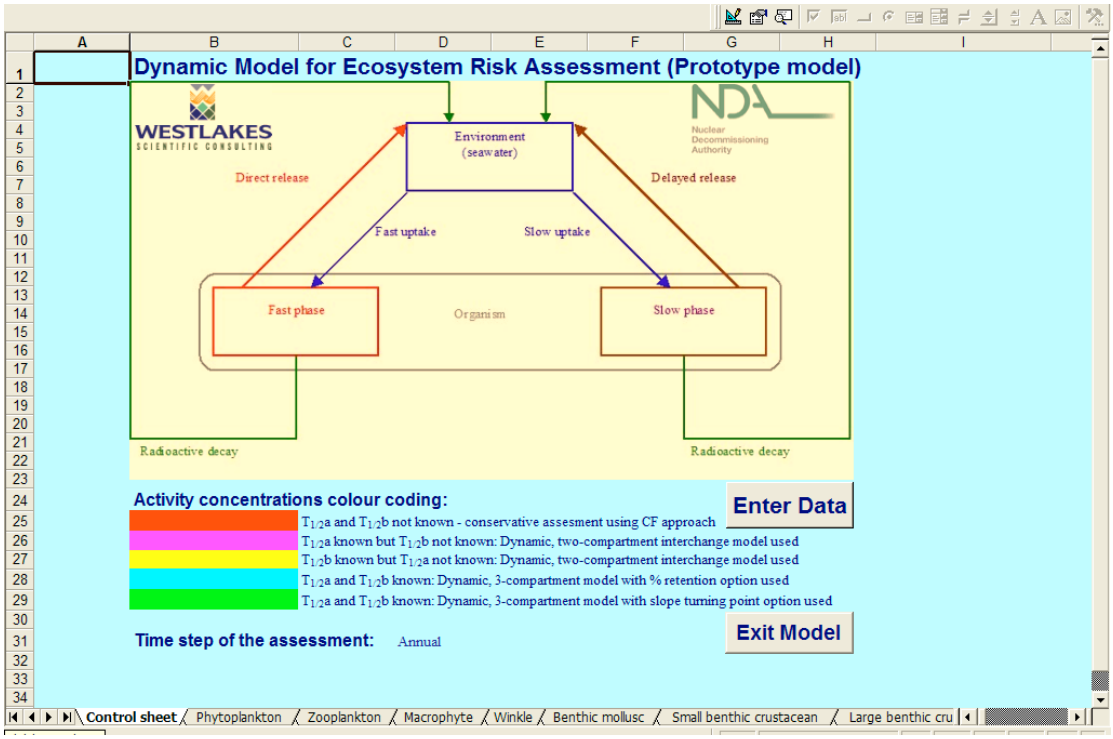


3) On presentation of the screen below click "Proceed" to continue or "Quit" to exit the program.

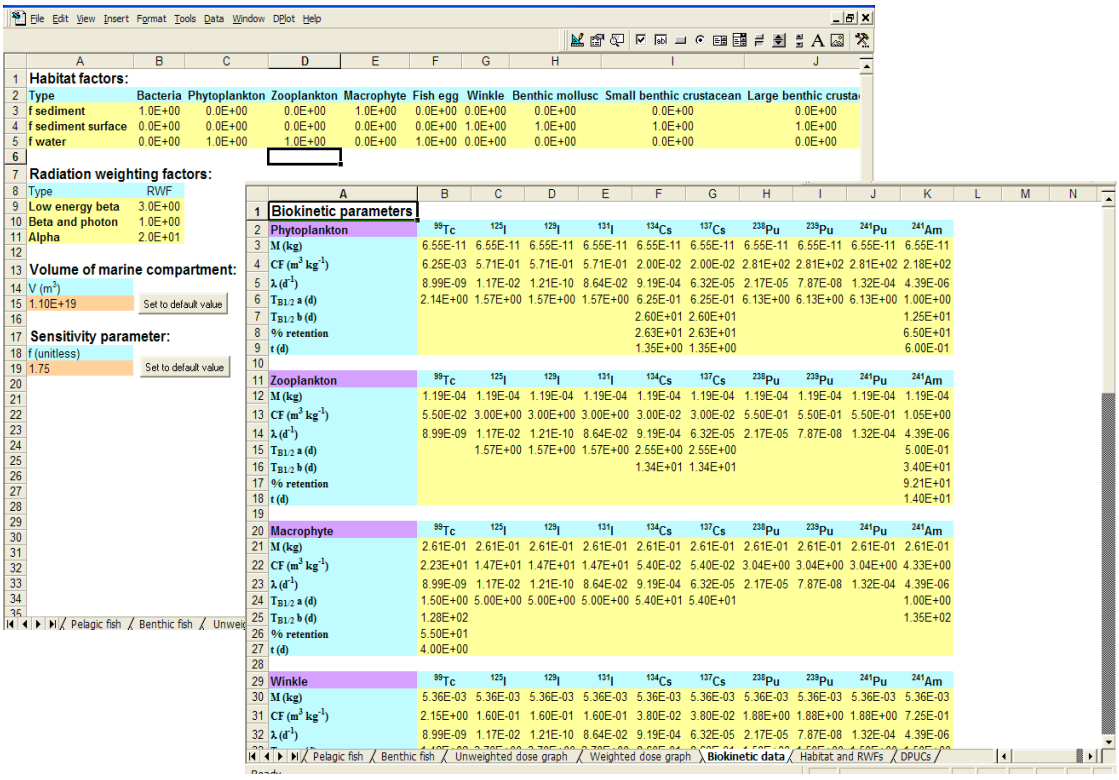
4) You are now presented with an option to clear water and sediment activity data from an earlier run to start a new one, or leave things as they are from a previous run. The latter option is useful if you want to repeat an assessment after modifying some of the assessment parameters, for example.



5) Clicking "Yes" leads to the displaying of the main "Control worksheet":



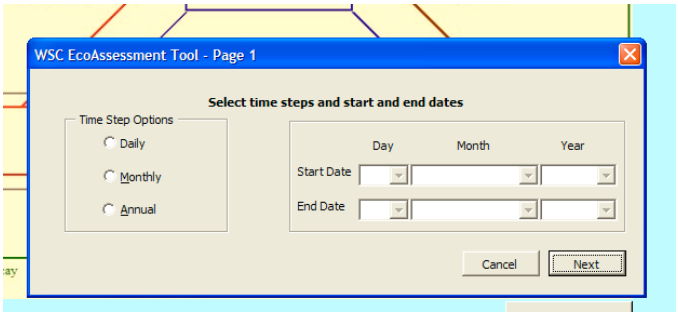
6) The next step is to set up the assessment. If you are happy to run with the default parameters (stored in the worksheets titled "Habitat and RWFs" and "Biokinetic data"):



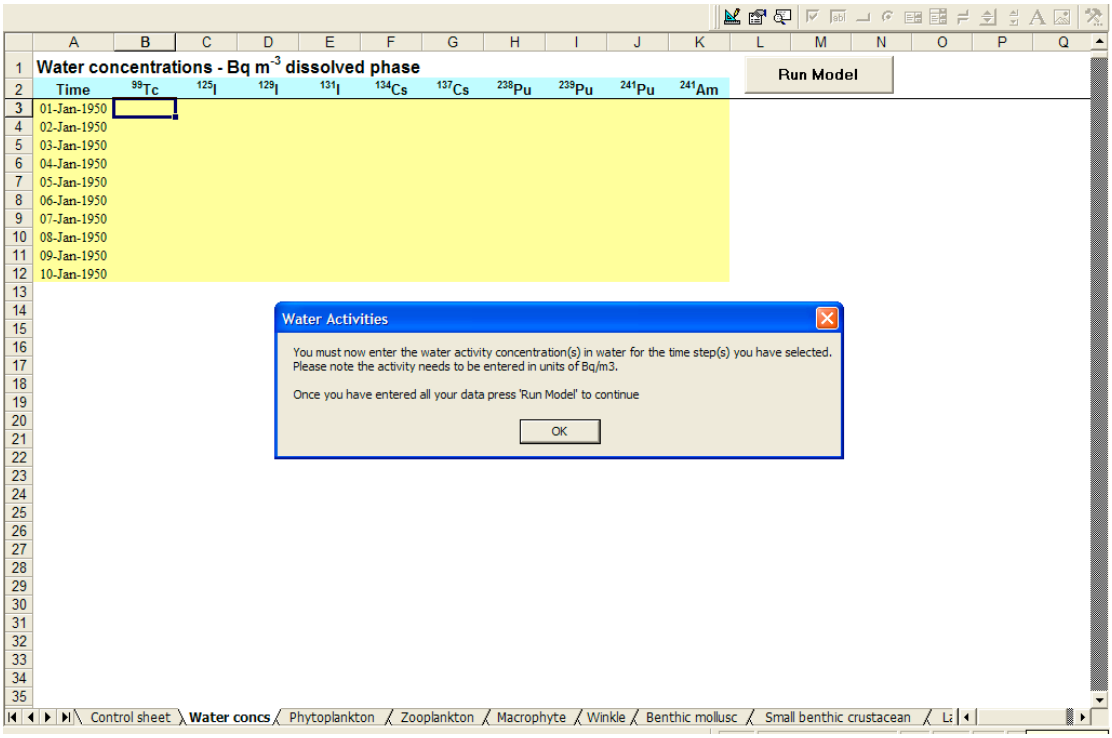
Then proceed to "Enter data". If you wish to alter any of the default parameters then go to the relevant worksheet, edit the parameters and then return to the control sheet to proceed.

Important note: All worksheets except "Habitat and RWFs", "Biokinetic data", "Seawater concs" and "Sediment concs" are write-protected to avoid accidental alteration of the default databases and code settings by the user.

7) Clicking "Enter data" leads to the display of the user form for the time step. You must now select the desired timescale for the radionuclide concentration input data, along with start and end dates. Then click on "Next".

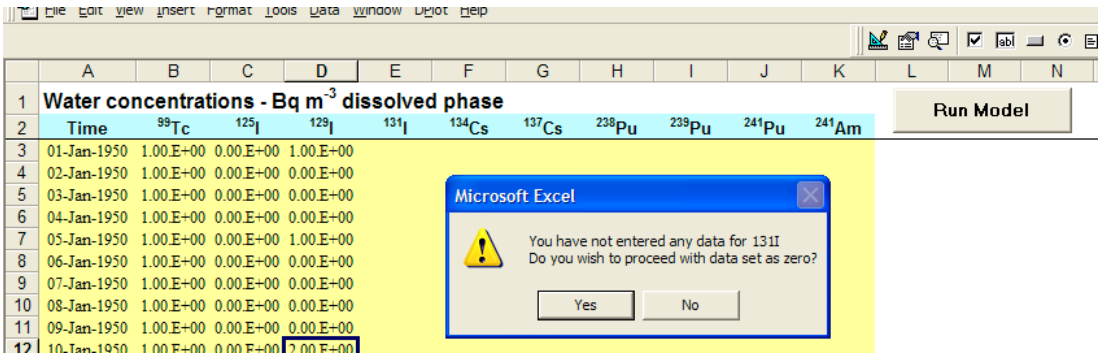


8) The seawater input data worksheet "Seawater concs" is now displayed:

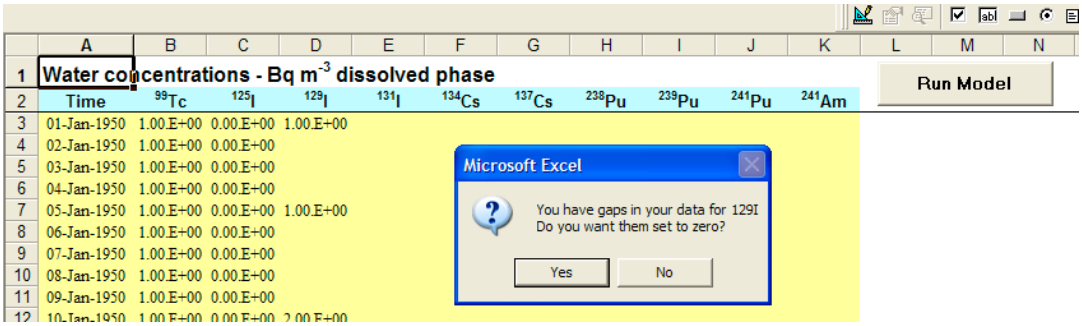


9) Click OK to continue and start entering data. Please note that the data should be entered in the correct units of Bq m^{-3}. Press "Run model" when finished. If the data entered are incomplete the user is presented with a series of options designed to give the maximum flexibility for users and assessors:

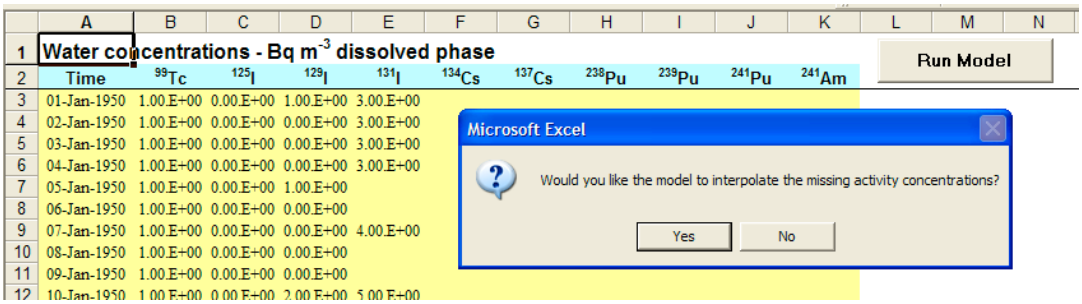
9a) Leaving columns of data blank results in a prompt asking if you want them to be set to zero. Clicking "No" results in the opportunity to enter more data. Clicking "Yes" results in the data for that radionuclide being set to zero.



9b) Leaving gaps in the data again leaves the option to set them to zero.

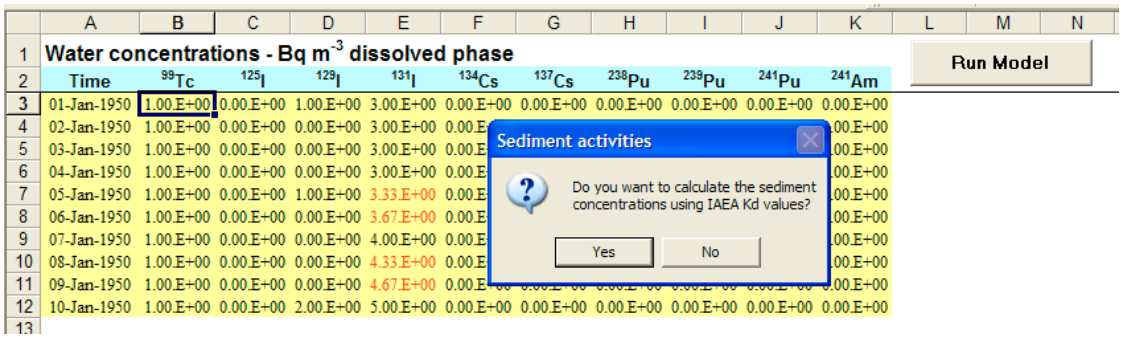


9c) If this is declined, another option appears to perform a linear interpolation of the missing data, with the interpolated data being coloured in red.

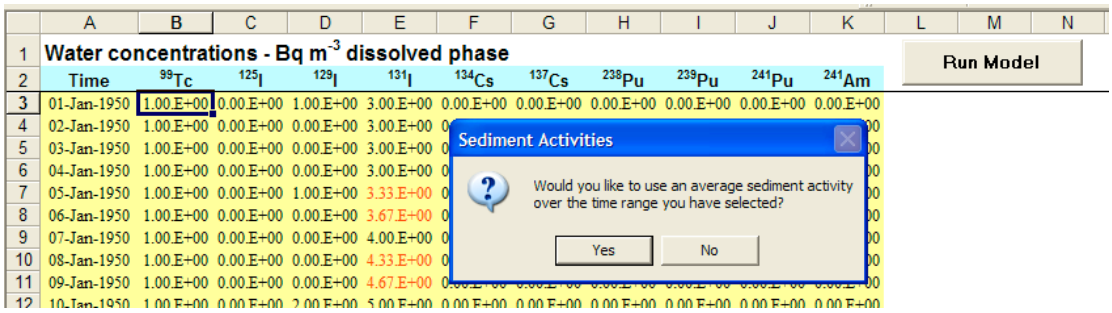


10) Sediment concentrations, which are needed for the calculation of external exposure doses, should be entered next. Please note that the data should be entered in the correct units of Bq kg^{-1}, dry weight. Sediment data entry is automatically prompted once the seawater concentration worksheet has been completely filled. Again there are a number of options:

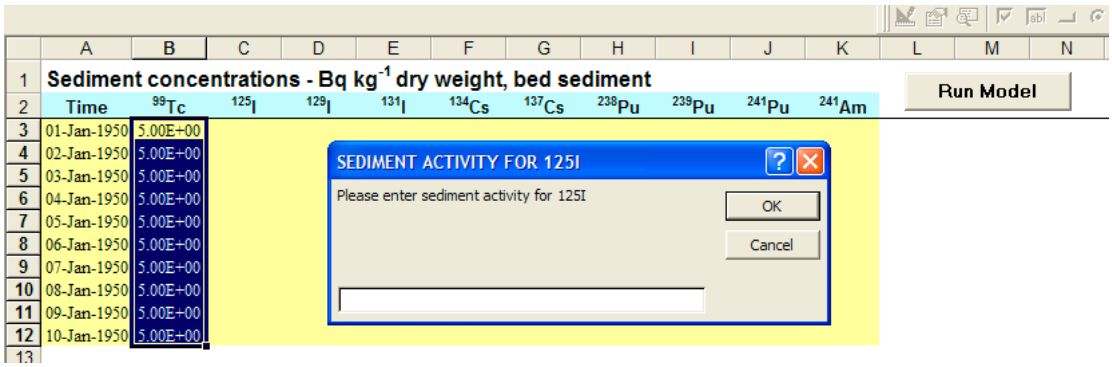
10a) The sediment concentrations can be calculated from the default K_d values available in the biokinetic database:



10b) Alternatively, by clicking “no”, another option appears to enter an average value for all years for each radionuclide. This is useful if there is a pre-existing background of historical discharges present in the sediment, which is significant compared with the temporary elevation in levels caused by the specific event that you are trying to model.



10c) Selecting that option results in a process of entering the average data one radionuclide at a time:



11) Once all the data entry is complete the assessment starts automatically. Upon completion of the calculations after a few seconds to minutes (depending on the number of time steps and the speed of the computer) the program returns to the control worksheet.

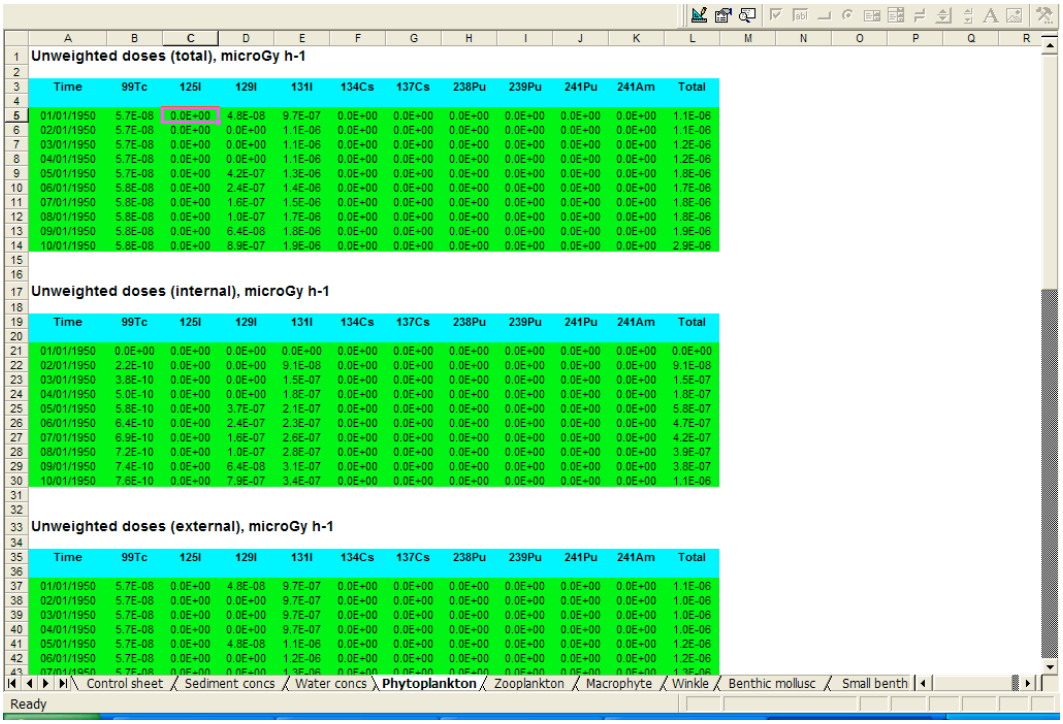
12) You might have chosen not to “Enter data” from the control worksheet at step 7 (i.e. if you chose not to clear the data from an earlier run at step 4). In that case you can rerun the assessment in two ways:

12a) From the worksheet “Water concs” press “Run assessment”, which will perform a run with the activity concentrations in water as already found in that worksheet. This will prompt the sediment calculation options as described in 10). Typically you will want to do this if you want to see what is the effect of increasing or decreasing the sediment concentrations is on external dose.

12b) Alternatively, the assessment can be rerun from the worksheet "Sediment concs" if the user is satisfied with the sediment concentrations already present and does not need to enter different values.

Extracting the data from an assessment

13) A worksheet of results is produced for each organism. This worksheet contains 7 tables: unweighted doses (total, internal and external exposure), weighted doses (total, internal and external), and calculated activity concentrations in biota.



Unweighted doses (total), microGy h-1

Time	99Tc	125I	129I	131I	134Cs	137Cs	238Pu	239Pu	241Pu	241Am	Total
01/01/1950	5.7E-08	0.0E+00	4.8E-08	9.7E-07	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-06
02/01/1950	5.7E-08	0.0E+00	0.0E+00	1.1E-06	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-06
03/01/1950	5.7E-08	0.0E+00	0.0E+00	1.1E-06	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-06
04/01/1950	5.7E-08	0.0E+00	0.0E+00	1.1E-06	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-06
05/01/1950	5.7E-08	0.0E+00	4.2E-07	1.3E-06	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.8E-06
06/01/1950	5.8E-08	0.0E+00	2.4E-07	1.4E-06	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.7E-06
07/01/1950	5.8E-08	0.0E+00	1.6E-07	1.5E-06	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.8E-06
08/01/1950	5.8E-08	0.0E+00	1.0E-07	1.7E-06	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.8E-06
09/01/1950	5.8E-08	0.0E+00	6.4E-08	1.8E-06	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.9E-06
10/01/1950	5.8E-08	0.0E+00	8.9E-07	1.9E-06	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.9E-06

Unweighted doses (internal), microGy h-1

Time	99Tc	125I	129I	131I	134Cs	137Cs	238Pu	239Pu	241Pu	241Am	Total
01/01/1950	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
02/01/1950	2.2E-10	0.0E+00	0.0E+00	9.1E-08	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	9.1E-08
03/01/1950	3.8E-10	0.0E+00	0.0E+00	1.5E-07	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.5E-07
04/01/1950	5.0E-10	0.0E+00	0.0E+00	1.8E-07	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.8E-07
05/01/1950	5.8E-10	0.0E+00	3.7E-07	2.1E-07	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.8E-07
06/01/1950	6.4E-10	0.0E+00	2.4E-07	2.3E-07	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.7E-07
07/01/1950	6.9E-10	0.0E+00	1.6E-07	2.6E-07	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.2E-07
08/01/1950	7.2E-10	0.0E+00	1.0E-07	2.8E-07	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.9E-07
09/01/1950	7.4E-10	0.0E+00	6.4E-08	3.1E-07	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.8E-07
10/01/1950	7.6E-10	0.0E+00	7.9E-07	3.4E-07	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-06

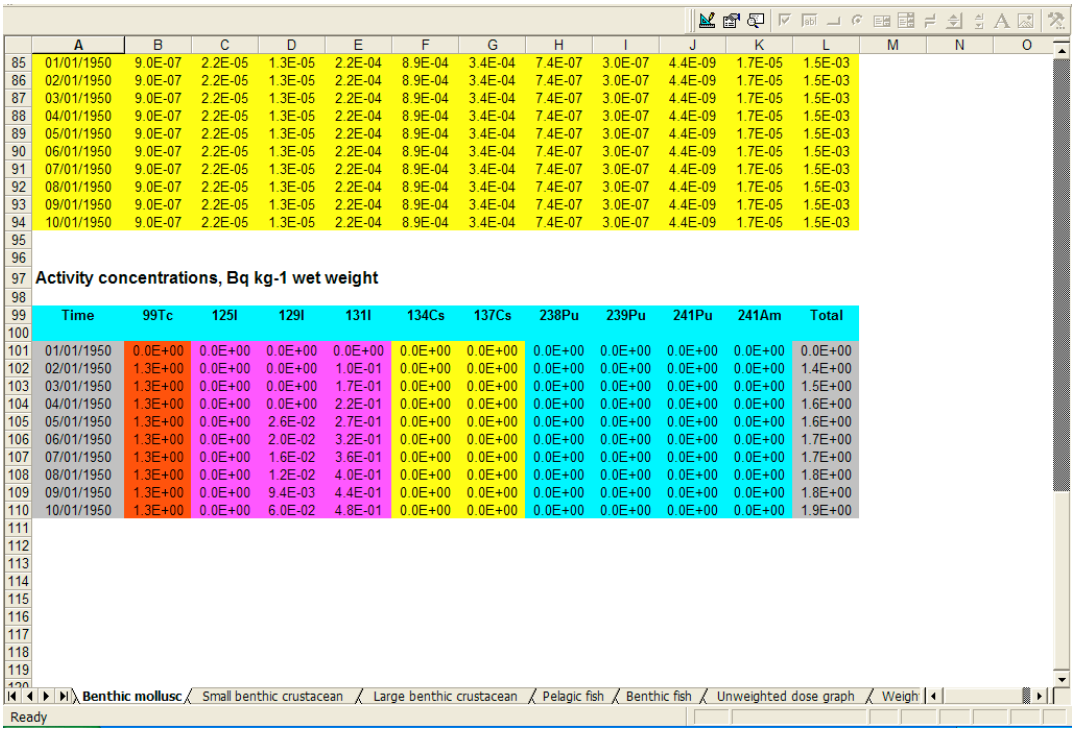
Unweighted doses (external), microGy h-1

Time	99Tc	125I	129I	131I	134Cs	137Cs	238Pu	239Pu	241Pu	241Am	Total
01/01/1950	5.7E-08	0.0E+00	4.8E-08	9.7E-07	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-06
02/01/1950	5.7E-08	0.0E+00	0.0E+00	9.7E-07	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.0E-06
03/01/1950	5.7E-08	0.0E+00	0.0E+00	9.7E-07	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.0E-06
04/01/1950	5.7E-08	0.0E+00	0.0E+00	9.7E-07	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.0E-06
05/01/1950	5.7E-08	0.0E+00	4.8E-08	1.1E-06	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-06
06/01/1950	5.7E-08	0.0E+00	0.0E+00	1.2E-06	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-06

Control sheet | Sediment concs | Water concs | **Phytoplankton** | Zooplankton | Macrophyte | Winkle | Benthic mollusc | Small benth

Ready

14) Organism concentration data in the relevant organism worksheets are colour-coded according to what variant of the model has been used to calculate them, for information to the user (colour codes are described in the control worksheet). An example is shown below:



	A	B	C	D	E	F	G	H	I	J	K	L
85	01/01/1950	9.0E-07	2.2E-05	1.3E-05	2.2E-04	8.9E-04	3.4E-04	7.4E-07	3.0E-07	4.4E-09	1.7E-05	1.5E-03
86	02/01/1950	9.0E-07	2.2E-05	1.3E-05	2.2E-04	8.9E-04	3.4E-04	7.4E-07	3.0E-07	4.4E-09	1.7E-05	1.5E-03
87	03/01/1950	9.0E-07	2.2E-05	1.3E-05	2.2E-04	8.9E-04	3.4E-04	7.4E-07	3.0E-07	4.4E-09	1.7E-05	1.5E-03
88	04/01/1950	9.0E-07	2.2E-05	1.3E-05	2.2E-04	8.9E-04	3.4E-04	7.4E-07	3.0E-07	4.4E-09	1.7E-05	1.5E-03
89	05/01/1950	9.0E-07	2.2E-05	1.3E-05	2.2E-04	8.9E-04	3.4E-04	7.4E-07	3.0E-07	4.4E-09	1.7E-05	1.5E-03
90	06/01/1950	9.0E-07	2.2E-05	1.3E-05	2.2E-04	8.9E-04	3.4E-04	7.4E-07	3.0E-07	4.4E-09	1.7E-05	1.5E-03
91	07/01/1950	9.0E-07	2.2E-05	1.3E-05	2.2E-04	8.9E-04	3.4E-04	7.4E-07	3.0E-07	4.4E-09	1.7E-05	1.5E-03
92	08/01/1950	9.0E-07	2.2E-05	1.3E-05	2.2E-04	8.9E-04	3.4E-04	7.4E-07	3.0E-07	4.4E-09	1.7E-05	1.5E-03
93	09/01/1950	9.0E-07	2.2E-05	1.3E-05	2.2E-04	8.9E-04	3.4E-04	7.4E-07	3.0E-07	4.4E-09	1.7E-05	1.5E-03
94	10/01/1950	9.0E-07	2.2E-05	1.3E-05	2.2E-04	8.9E-04	3.4E-04	7.4E-07	3.0E-07	4.4E-09	1.7E-05	1.5E-03

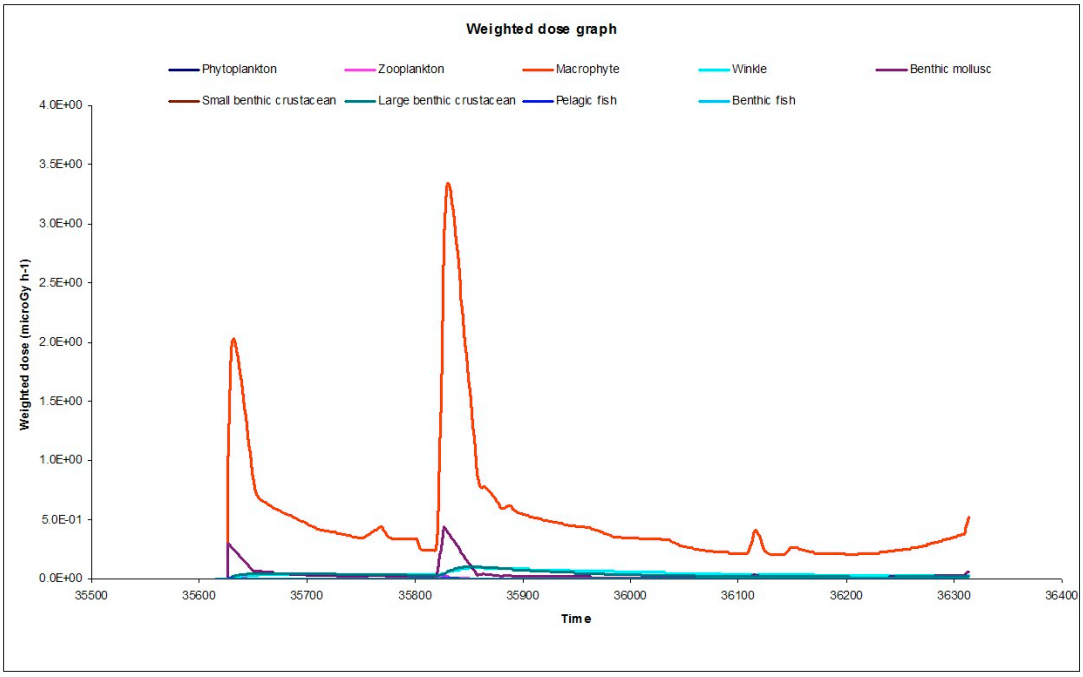
Activity concentrations, Bq kg-1 wet weight

Time	99Tc	125I	129I	131I	134Cs	137Cs	238Pu	239Pu	241Pu	241Am	Total
01/01/1950	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
02/01/1950	1.3E+00	0.0E+00	0.0E+00	1.0E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.4E+00
03/01/1950	1.3E+00	0.0E+00	0.0E+00	1.7E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.5E+00
04/01/1950	1.3E+00	0.0E+00	0.0E+00	2.2E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.6E+00
05/01/1950	1.3E+00	0.0E+00	2.6E-02	2.7E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.6E+00
06/01/1950	1.3E+00	0.0E+00	2.0E-02	3.2E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.7E+00
07/01/1950	1.3E+00	0.0E+00	1.6E-02	3.6E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.7E+00
08/01/1950	1.3E+00	0.0E+00	1.2E-02	4.0E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.8E+00
09/01/1950	1.3E+00	0.0E+00	9.4E-03	4.4E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.8E+00
10/01/1950	1.3E+00	0.0E+00	6.0E-02	4.8E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.9E+00

Benthic mollusc | Small benthic crustacean | Large benthic crustacean | Pelagic fish | Benthic fish | Unweighted dose graph | Weigh

Ready

15) Additionally, two worksheets are provided which display graphs for total unweighted and total weighted doses, as shown in the following example:



16) Because the worksheets are write-protected it is not possible to edit or perform calculations within them. The preferred method is to "select all" – "copy" – "paste" the data from one worksheet into a separate workbook from whence the usual editing can be performed.

Support

If you encounter any bugs or problems when using this model, please contact the following address:

Dr. Jordi Vives i Batlle

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