

Activities of the Tritium/C14 Working Group

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Objectives of the WG

- **To establish the confidence in the predictions of environmental tritium and C-14 models, particularly models for the formation and translocation of organically bound tritium (OBT)**
- **To recommend modelling approaches that will result in improved predictions**
- **To encourage experimental work that will lead to data sets that can be used in model testing**



Test Scenarios

Complete

- Perch Lake scenario
- Soybean scenario
- Pickering scenario

Ongoing

- Hypothetical scenarios
- Pine tree scenario
- Rice scenario (C-14)
- Mussel scenario
- Nature and definition of OBT

In Preparation

- Animal scenarios



Perch Lake Scenario

A test of models that predict tritium concentrations in aquatic ecosystems at steady state

Predicted HTO concentrations generally lay within 30% of the observations

Predicted OBT concentrations generally lay with a factor of 2 of the observations

The final report is complete and will be published shortly





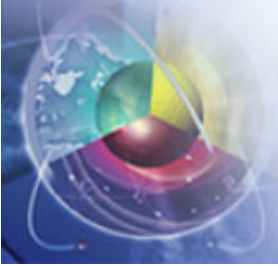
Soybean Scenario

A test of models that predict the time-dependent behaviour of tritium in plants acutely exposed to elevated levels of HTO in air

The models generate a significantly smaller amount of OBT per unit time-integrated HTO concentration than the plants produce in reality



A draft final report has been produced and will be finalized this week



Pickering Scenario

A test of models that predict tritium concentrations in agricultural ecosystems at steady state

The models performed well for HTO concentrations in soil, milk and beef, and for OBT in milk

The models overpredicted OBT concentrations in plants and HTO and OBT concentrations in eggs and chicken flesh



A draft final report has been produced and will be finalized this week



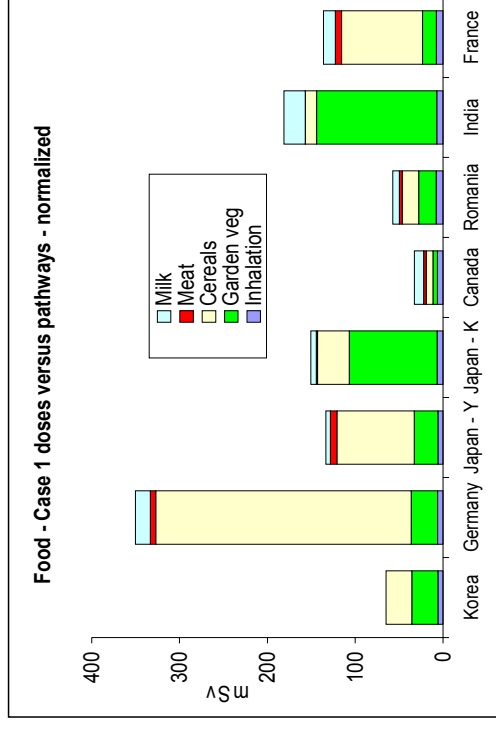
Hypothetical Scenarios

To assess the consequences of an acute atmospheric release of tritium with the aim of providing guidance to decision-makers in managing the accident

Large differences in predicted air concentrations were reduced by defining the scenario more precisely

The models predict very different contributions to total dose by the different exposure pathways

The latest results will be discussed this week to try to explain these differences





Pine Tree Scenario

A test of models that predict tritium concentrations in needles and tree rings for trees growing near a continuous atmospheric source of HTO

The initial predictions of HTO concentrations in pine needles scattered around the observations

The scenario was revised to include a more detailed ground-water component

The latest results will be discussed this week and reasons for differences in predictions will be sought





Rice Scenario (C-14)

A test of models that predict steady-state C-14 concentrations in plants growing near a continuous atmospheric source of C-14

The scenario description was distributed during the summer and the first round of calculations has been submitted

The results will be discussed at this meeting





Mussel Scenario

A test of models that predict the time-dependent behaviour of tritium in aquatic organisms exposed to an abrupt change in tritium concentrations in their environment

The scenario description was distributed during the summer and the first round of calculations has been submitted

The results will be discussed at this meeting





Scenarios Involving Large Animals

Scenarios are still in the planning stage. A number of data sets are being considered involving short-term or prolonged exposure of cows or pigs through their diet.

The scenarios will test dynamic models of HTO and OBT behaviour in large animals

A test scenario involving large animals will be adopted at this meeting





Nature and Definition of OBT

- The OBT of interest from a dose point of view is carbon-bound tritium
- In practice, OBT concentrations are determined experimentally as the activity of non-exchangeable tritium in the combustion water of the dried sample in question
- Some of the non-exchangeable tritium in the combustion water may not be carbon bound, but associated with large molecules that remain after the exchangeable tritium is removed (buried tritium)
- Buried tritium is immediately released as HTO during digestion and does not have the dose consequences of OBT
- Experiments investigating the existence of buried tritium are going on in two member labs