The IAEA's Programme on Environmental Modelling for RAdiation Safety (EMRAS II)

EMRAS II
Approaches for Assessing Emergency Situations
Working Group 7
Tritium Accidents

M I N U T E S

of the First Meeting held at IAEA Headquarters, Vienna
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IAEA Scientific Secretary	Working Group Leader
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Background

Results from the Working Group "Modelling of Tritium and Carbon-14 Transfer to Biota and Man" of the first phase of the IAEA's EMRAS Programme demonstrated that *"The dynamics of OBT and ^{14}C concentrations were generally poorly reproduced in scenarios involving short-term releases"*. The uncertainties in the existing models for acute release are high. This large uncertainty is not acceptable for licensing and accident preparedness at utilities with large tritium inventories, or for activities involving tritium transport.

The models used during EMRAS were produced in the past (1990–1999) or specially elaborated for the scenarios, from scratch. The models must incorporate new knowledge for credibility. Two major weaknesses were detected:

— OBT (organically bound tritium) models need improvements (e.g. the rate of OBT formation at night is not well understood);

— Processes for tritium transfer and conversion to OBT when it is raining or snowing need better understanding.

Aims and Objectives

The aims and objectives of the EMRAS II Working Group 7 "Tritium Accidents" (WG 7) are to:

— develop a standard conceptual dynamic model for tritium dose assessment for acute releases to the atmosphere and water bodies;

— drive the new model with given air or water concentrations (HT or HTO) and the duration of the exposure. These concentrations will be obtained by each major user from the best available atmospheric and aquatic transport models for the site in question. The question of tritium wash-

out, which is not specifically addressed in atmospheric dispersion models, needs to be further investigated;

— agree on common sub-models for specific transfers or processes, based on an interdisciplinary approach involving the understanding of the processes and key parameters, based on recent findings in all Life Sciences;

— define the framework for an operational model (requirements for meteorological data, atmospheric transport, site specific data);

— obtain or develop quality assured sub-models that will result in predictions with a moderate degree of conservatism; and

— have the capability to assimilate real measured data into the models.

Working Plans

Immediate Provisional Working Plan (up to the next meeting)

— To check if the models in TRS-364 can be partially used for acute releases (do an example calculation for an acute release using a routine release model);

— to make available the existing models (i.e. ETMOD, UFOTRI, OURSON, RODOS-FDMH and GAZAXI) to guide the way forward;

— to establish a tritium modelling knowledge base (ask the IAEA to host a page on the EMRAS II website);

— to compile experimental tritium datasets (especially for transfer from air/soil/water to plants, and air to rain);

— to define the framework for linking dispersion models (atmospheric or aquatic with site-specific data) to the new conceptual tritium model;

— to identify financial support;

— to send a questionnaire to other potential participants; and

— tentatively, to hold the next WG 7 Meeting in September, in France.

Long Term Provisional Working Plan

— To use current research regarding tritium transfer in animals to construct a simple but robust new tritium model;

— to update the documentation review of processes and parameter uncertainties of present tritium modelling (RODOS(WG3)-TN(98)-07);

— to collect data for constructing a new plant model;

— to gain knowledge from other experts (e.g., life scientists) regarding photosynthesis and water cycles in plants; and

— to optimize the existing soil/plant transfer model for tritium.

End Result

A new document covering the conceptual processes that must be considered in modelling acute tritium releases (and the associated mathematical/numerical formulations). (January 2012)

List of Participants	
Name / Email	**Organization / Country**
Mr Franz Baumgärtner (bgtbgt@web.de)	Technische Universität München, Germany
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Mr Vasile Simionov (vsimionov@cne.ro)	"CNE-PROD" Cernavoda NPP, Societatea Nationala Nuclearelectrica S.A. (SNN), Romania (CANDU reactors)

* Not present but likely to participate.

Key researcher who requires funding.

From Romania, the further participation of Ms A. Melintescu is assured and the participation of the owners of the Cernavoda CANDU power station is confirmed.

Participation will also be solicited from Japan, Russia, China, Korea and USA.

Mr P. Guetat will try to contact key persons involved in safety and environment for the International Thermonuclear Experimental Reactor (ITER), where tritium is a key factor for safety.

Because of general financing problems, WG leadership is currently provisional. The tentative Working Group Leader is Mr D. Galeriu (IFIN-HH Romania), assisted by Mr P. Guetat (CEA France), Mr S.L. Chouhan (AECL Canada) and Mrs F. Siclet (EdF France).

Organizations interested in participating in the WG include:

Romania (IFIN-HH, Nuclearelectrica_CNE) 2 participants or more
Canada (AECL, CNSC, Health Canada, COG) 4 participants
France (CEA, EDF, IRSN) 4 participants or more
Slovakia (VUJE Inc) 1 participant
Czech Republic (NRPI) 1 participant
Mongolia (Nuclear Research Centre) 1 participant
Germany (KFK, to be confirmed) 1 or more participants
Ukraine (NIIEP) 1 participant