

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

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

**of the Fifth WG7 Meeting held at IAEA Headquarters, Vienna  
24–28 January 2011  
(during the Third EMRAS II Technical Meeting)**

IAEA Scientific Secretary	Working Group Leader
<p>Mr Volodymyr Berkovskyy (<i>VB</i>) Assessment &amp; Management of Environmental Releases Unit Waste &amp; Environmental Safety Section (Room B0764) Division of Radiation, Transport &amp; Waste Safety International Atomic Energy Agency (IAEA) Vienna International Centre PO Box 100 1400 VIENNA AUSTRIA Tel: +43 (1) 2600-21263 Fax: +43 (1) 2600-7 Email: V.Berkovskyy@iaea.org</p>	<p>Mr Dan Galeriu (<i>DG</i>) Senior Researcher/Project Manager Department of Life &amp; Environmental Physics "Horia Hulubei" National Institute of Physics &amp; Nuclear Engineering (IFIN-HH) 30 Reactorului Street P.O. Box MG-6 RO-077125 BUCHAREST-MAGURELE ROMANIA Tel: +40 (21) 404-2359 Fax: +40 (21) 457-4440 Email: galdan@ifin.nipne.ro / dangaler@yahoo.com</p>

Attending	
Name / Initials* / Email	Organization / Country
Mr Pierre Cortes ( <i>PC</i> ) (pierre.cortes@iter.org)	ITER Organization, FRANCE
Mr Paul Dale ( <i>PD</i> ) (paul.dale@sepa.org.uk)	Scottish Environment Protection Agency (SEPA), UK
Mr Juraj Duran ( <i>JD</i> ) (duran@vuje.sk / juraj.duran@ttonline.sk)	VÚJE Inc. - Engineering, Design & Research Organization, SLOVAK REPUBLIC
Mr Philippe Guetat ( <i>PG</i> ) (philippe.guetat@cea.fr)	Commissariat à l'Energie Atomique (CEA) – Valduc, FRANCE
Mr Markus Iseli ( <i>MI</i> ) (markus.iseli@iter.org)	ITER Organization, FRANCE
Mr Pierrick Jaunet ( <i>PJ</i> ) (pierrick.jaunet@asn.fr)	Autorite de Surete Nucleaire (ASN), FRANCE
Mr Vladimir Korolevych ( <i>VK</i> ) (korolevv@aecl.ca / korolevych@aecl.ca)	Atomic Energy of Canada Limited (AECL), CANADA
Mr Sergey Lukashenko ( <i>SL</i> ) (lukashenko@nnc.kz / essenik@gmail.com)	National Nuclear Center, REPUBLIC OF KAZAKHSTAN
Ms Anca Melintescu ( <i>AM</i> ) (ancameli@ifin.nipne.ro / melianca@yahoo.com)	"Horia Hulubei" National Institute of Physics & Nuclear Engineering, ROMANIA
Mr Steve Mihok ( <i>SM</i> ) (steve.mihok@cnsccsn.gc.ca)	Canadian Nuclear Safety Commission (CNSC), CANADA
Mr Hartmut Nies ( <i>HN</i> ) (H.Nies@iaea.org)	Marine Environment Laboratories, MONACO International Atomic Energy Agency
Mr Masakazu Ota ( <i>MO</i> ) (ohta.masakazu@jaea.go.jp)	Japan Atomic Energy Agency (JAEA), JAPAN

\*Initials used to refer to participants within minutes and actions as appropriate.

<b>Attending</b>	
<b>Name / Initials* / Email</b>	<b>Organization / Country</b>
Mr Luc Patryl ( <i>LP</i> ) (luc.patryl@cea.fr / luc.patryl@free.fr)	Commissariat à l'Energie Atomique (CEA), FRANCE
Mr Wolfgang Raskob ( <i>WR</i> ) (wolfgang.raskob@kit.edu)	Institut für Kern- und Energietechnik (IKET), Karlsruhe Institute of Technology (KIT), GERMANY
Mrs Françoise Siclet ( <i>FS</i> ) (francoise.siclet@edf.fr)	Electricité de France (EDF) - Département Environnement (R&D), FRANCE
Mrs Synnove Sundell-Bergman ( <i>SSB</i> ) (synnove.bergman@vattenfall.com)	Swedish University of Agricultural Sciences (SLU), SWEDEN
Mrs Tamara Yankovich ( <i>TY</i> ) (yankovich@src.sk.ca)	Saskatchewan Research Council (SRC), CANADA

\*Initials used to refer to participants within minutes and actions as appropriate.

## Background

The EMRAS II Working Group 7 (WG7) “Tritium” Accidents, includes certain areas of interest in connection with accidental releases of tritium in the environment, i.e. 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 washout, which is not specifically addressed in atmospheric dispersion models, needs to be further investigated;
- agree on common submodels 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 submodels that will result in predictions with a moderate degree of conservatism; and
- have the capability to assimilate real measured data into the models.

## Working Group attendance

This meeting was the fifth meeting of WG7 and was held as part of the Third EMRAS II Technical Meeting, at IAEA Headquarters in Vienna, Austria. Seventeen participants from 10 countries attended and the sessions were moderated by *DG* and *VB* served as the IAEA’s Scientific Secretary.

## Scope and Objectives of the Meeting

The main objectives of the meeting were to:

- discuss and harmonize the views of participants concerning the approaches for developing the conceptual model for tritium accidents (atmospheric and aquatic);
- agree on the structure and scope of the conceptual model;
- agree on the structure of final WG7 report (TECDOC);
- presentations and discussions on draft documents for: tritium interaction matrix, tritium washout, tritium in aquatic environments;
- overview of tritium transfer from air to crops and the subsequent conversion to OBT;
- key parameters for tritium modelling; and
- specific features of German and Japanese models.

## Work performed

The meeting began with a short overview of the conclusions and the work plan agreed during the previous (fourth) WG7 meeting held in Aix-en-Provence, France, in September 2010. The general ideas of model uncertainties were discussed and advanced draft documents for tritium washout and tritium interaction matrix were presented.

Various participants made presentations on exchange velocity approach and the formation of OB<sub>T</sub> during the day time, OB<sub>T</sub> formation during the night time based on published and unpublished results, numerical exercises with SOLVEG model for different soil types in case of rain during the daytime and night time, Canadian Land Surface Scheme (CLASS). Special sessions were dedicated to the need for accurate OB<sub>T</sub> measurements and to critical parameters of tritium transfer from atmosphere to plants.

Concerning the document on tritium transfer in aquatic environments, it was agreed that the Romanian model will be included in the document after the submitted paper, describing the model, has been accepted for publication. A short discussion was then dedicated to tritium in drinking water.

Very interesting issues were discussed with *SM* such as: direct uptake mechanism of OB<sub>T</sub> by plants from soil, direct uptake mechanism of HT by plants, because in Canada, they found OB<sub>T</sub> in fruit trees, mainly in apple trees. *DG* pointed out that a possible explanation could lie in OB<sub>T</sub> accumulation in tree rings, but it is an open problem. Another interesting issue discussed with *SM* was connected with the tritium forms existing in soil and whether it is possible to have OB<sub>T</sub> in soils, because in Canada, they also detected some tritium linked with organics in soil. The fact was emphasized that all of these tritium forms found in soil are connected to laboratory problems or there are biological issues which must be clarified. Furthermore, all such problems are more difficult to explain for low tritium concentration. Concerning tritium transfer, it seems that there are still open questions. At many stages of the discussions, participants were asked to contribute with specific tasks and written documents for the next meeting. Details of these tasks are provided below.

## Future Work Programme

Action	Person	Date
Introduction on tritium accidents	P. Cortes	June 2011
Final document on interaction matrix	S. Le Dizès-Maurel	End of March 2011 – WG members must send the comments to S. Le Dizès-Maurel Final document – June 2011
Final document on tritium washout	L. Patryl, D. Galeriu, A. Melintescu	September 2011
Final document on aquatic pathways	F. Siclet, A. Melintescu, F. Lamego, S.B. Kim	May 2011 – Experimental data about fish food, HTO in fish dynamics, and preliminary results for OB <sub>T</sub> feeding - S.B. Kim May 2011 – D. Galeriu, A. Melintescu to include the Cardiff case Final document – September 2011
Final document on terrestrial pathways	D. Galeriu, A. Melintescu	September 2011 - Tritium transfer in farm animals – D. Galeriu, A. Melintescu September 2011 – HTO uptake in plants and the OB <sub>T</sub> formation during the day time – A. Melintescu, D. Galeriu and other interested WG members September 2011 – HTO uptake in plants and the OB <sub>T</sub> formation during the night time – D. Galeriu, A. Melintescu and other interested WG members
Final document on HT and HTO dry deposition and reemission from soil an plants	H. Nagai, M. Ota	September 2011

Action	Person	Date
Working document on appropriate crops models (simple and process level); classes of crops	All WG members	June 2011 – WG members to send their contributions to Dan Galeriu Draft document – September 2011
Final document on sources of models' uncertainty	J. Duran	June 2011
Draft on the review of soil – plant models	V. Korolevych	June 2011 to send to Dan Galeriu Final draft – September 2011
Final document on the description of a complex model (SOLVEG)	H. Nagai	September 2011

### Next Meeting

The next (sixth) Working Group 7 Meeting is provisionally scheduled to take place in Romania (if it is possible to have funding, follow to let the people know in due time) or at IAEA Headquarters in Vienna, sometime in September 2011.

## WG7 MEETING AGENDA

### Monday, 24 January 2011

09:30–13:00	Opening Plenary Session	
13:00–14:00	<i>LUNCH BREAK</i>	
14:00–14:15	Introduction	Volodymyr Berkovskyy (IAEA Sci. Sec) / Dan Galeriu, WGL (IFIN-HH, Romania)
14:15–14:30	*Uncertainty and discussions	Juraj Duran (VÚJE Inc., Slovak Republic)
14:30–15:30	T washout	Luc Patryl (CEA, France)
15:30–16:00	<i>COFFEE BREAK</i>	
16:00–16:45	Presentation: *Tritium Interaction Matrix (I) Document: *Interaction matrices and associated processes for terrestrial pathways of tritium transfer	Severine Le Dizès-Maurel* (IRSN, France)
16:45–17:15	Open to unplanned interventions	All WG participants

### Tuesday, 25 January 2011

09:00–09:15	Introduction to terrestrial pathway	Dan Galeriu
09:15–10:30	Exchange velocity and formation on *OBT in day time	Anca Melintescu (IFIN-HH, Romania)
10:30–11:00	<i>COFFEE BREAK</i>	
11:00–11:15	*Precursors of Tritium WG	Dan Galeriu
11:15–11:30	*Plant OBT model	Wolfgang Raskob (KIT, Germany)
11:30–12:30	*OBT formation in night time: Data-processes and modelling trials	Dan Galeriu All WG participants
12:30–14:00	<i>LUNCH BREAK</i>	
14:00–15:00	Numerical exercises using *SOLVEG model for different soil types and in case of rain during the daytime and night time	Masakazu Ota (JAEA, Japan)
15:00–15:30	Intervention of old and new participant: need of accurate OBT measurements	All WG participants
15:30–16:00	<i>COFFEE BREAK</i>	
16:00–17:00	Open discussion on chances to have a final document on terrestrial pathway under accidental release	All WG participants

### Wednesday, 26 January 2011

09:00–10:30	Plenary Session	
10:30–11:00	<i>COFFEE BREAK</i>	
11:00–12:00	Porting the tritium dynamical model into soil moisture block of Canadian Land Surface Scheme (*CLASS)	Vladimir Korolevych (AECL, Canada)
12:00–13:00	*Critical parameters of tritium transfer from atmosphere to plants	Philippe Guetat (CEA-Valduc, France)
13:00–14:00	<i>LUNCH BREAK</i>	
14:30–15:15	Presentation: Organically bound tritium (*OBT) in freshwater ecosystems – Long term trends in the environment of French nuclear power stations (NPPs) Presentation: *Dynamic transfer in the aquatic and terrestrial environment of tritium liquid releases Document: *Modelling tritium in aquatic environments	Francoise Siclet (EDH/R&D, France) All WG participants
15:15–15:30	Last experiments on OBT at AECL	Vladimir Korolevych
15:30–16:00	<i>COFFEE BREAK</i>	
16:00–16:30	T *washout and groundwater problems	Dan Galeriu All WG participants
16:15–16:30	Tritium in drinking water: What to recommend	All WG participants
16:30–16:50	Open discussions	All WG participants

### Thursday, 27 January 2011 (WG7 did not meet, attendance at other WG Meetings)

### Friday, 28 January 2011

09:00–13:00	Closing Plenary Session	
-------------	-------------------------	--

\* Indicates the name of the presentation given on the WG7 web page (<http://www-ns.iaea.org/projects/emras/emras2/working-groups/working-group-seven.asp?s=8&l=63>).

\* Participant unable to attend, presentation was given by Dan Galeriu (WGL).