TRS 364 Working group : Revision of IAEA Technical Report Series No. 364, "Handbook of parameter values for the prediction of radionuclide transfer in temperate environments".

Minutes of the combined Working group meeting, 21st – 25th November 2005, the IAEA Headquarters, Vienna, Austria
By Ph. Calmon

List of Participants

Mr. Calmon, P.	IRSN	France	Chairman
Mr. Choi, Y.H.	KAERI	Korea	
Mr. Ciffroy, P.	EDF	France	
Mr. Conney, S.	Food Standards Agency	The U.K.	
Mr. Fesenko, S.	NAAL Seibersdorf	Austria	
Mr. Garcia-Sanchez, L.	IRSN	France	
Mr. Isamov, N.	RIARAE	Russia	
Mr. Jourdain, F.	CEA	France	
Mr. Kashparov, V.	UIAR	Ukraine	
Mr. Konoplev, A.	SPA Typhoon	Russia	
Ms. Leclerc-Cessac, E.	ANDRA	France	
Mr. Martin, P.	IAEA	Austria	
Mr. Proehl, G.	GSF	Germany	
Ms. Rigol, A.	Universitat de Barcelona	Spain	
Ms. Sanzharova, N.	RIARAE	Russia	
Mr. Shang, Z.	NNSC, SEPA	China	
Ms. Shubina, O.	RIARAE	Russia	
Ms. Strebl, F.	ARC Seibersdorf	Austria	
Ms. Tagami, K.	NIRS	Japan	
Mr. Thiry, Y.	SCK-CEN	Belgium	
Mr. Uchida, S.	NIRS	Japan	
Ms. Vandenhove, H.	SCK.CEN	Belgium	
Mr. Van Dorp, F.	NAGRA	Switzerland	
Mr. Vidal, M.	Universitat de Barcelona	Spain	
Ms. Voigt, G.	NAAL Seibersdorf	Austria	Scientific secretary
Ms. Yankovich, T.	AECL	Canada	
Mr. Zibold, G.	Hochschule Ravensb.-Weingarten	Germany	
Mr. Horyna, J.	SUJB	Czech Republic	
Mr. Ravi, P.M.	BARC	India	
Mr. Beresford, N.	CEH	The U.K.	"Dose to biota" WG
Mr. Davis, P.	AECL	Canada	"^{3}H & ^{14}C" WG
Ms. Howard, B.	CEH	The U.K.	"Dose to biota" WG
Mr. Monte, L.	ENEA	Italy	"Freshwater" WG

Meeting objectives

Main objectives of the meeting were : (i) to evaluate the progress in the TRS development, (ii) to discuss new contributions and (iii) to identify the necessary actions for the successful TRS progress.

Foreword

I wish to thank all the participants for their work during this week and also the working group leaders from the other EMRAS working group for their future contributions to the revision of the TRS 364. This week was very fruitful because of the discussions on the 25 contributions which were presented and the conclusions of the soil-to-plant transfer task group which were necessary to initiate the filling of the database. We have now the challenge to produce a draft for the next year and the minutes will be devoted to show for which chapters we can be optimistic and for which ones we have to put more efforts.

1 – Introductive chapters and basic concepts

The first two chapters were not discussed within the meeting. The concepts of these chapters were discussed in Aix-en-Provence (June 2005) based on ideas provided by Mr. Pascal Santucci who was the person in charge of these chapters drafting. Because of his unexpected death their further development was delayed. It has been decided in the meeting to create a small group of volunteers (Mrs. Ph. Calmon, S. Fesenko, G. Proehl and F. Van Dorpe) to finalise the concept of these chapters and to draft them by the next interim meeting.

2 – Chapters requiring minor improvements

Several contributions can be considered as the first drafts for the TRS, even if some minor improvements have to be made before the next interim meeting. These contributions concern the following chapters :

2.1 Use of analogues (Ms. E. Leclerc-Cessac)
This contribution is concise and well structured, however, some important details of the approach application is not clear. Thus, more examples should be provided mainly for foliar transfer, root uptake (soil-plant transfer) and migration in soils. Such examples could be presented or in the general chapter devoted to analogous or in each corresponding chapters.

2.2 Interception of dry and wet deposition (Mr. G. Proehl)
This contribution is quite well developed for the time being. However, some tables should be extended.

2.3 Soil Kds (Mr. M. Vidal & Ms. A. Rigol)
This contribution should be shortened in order to be as concise as possible. Processing of data, which are already available, could allow providing tables of parameter values for the next interim meeting.

2.4 Run-off / wash-off (Mr. L. Garcia-Sanchez)
This contribution is quite advanced. However, some explanations should be added addressing to the use of contextual/supplementary parameters (such as slope, rainfall, soil types, etc.) presented in the general equations describing radionuclide transfer caused by run-off / wash-off.

2.5 Chlorine-36 (Ms. E. Leclerc-Cessac)

The contribution is very advanced one. However, the creation of a special chapter for chlorine has to be discussed. Another possible option is to provide parameter values for compartment model in each specific. A "specific activity model" should be considered as an alternative way to simulate the transfer of this element in the environment, but also for other radionuclides (eg., ^{14}C, ^{3}H). However, main limitations of the use of such models (steady-state, equilibrium, etc.) should be described and parameters for such model application should be supplied. Mr. Philippe Guetat (CEA, France) has offered his assistance to Ms. E. Leclerc-Cessac with some parameter values.

3 – Chapters requiring further development before the next interim meeting

Some papers, even if these are not completed, should be ameliorated during the six next months in order to constitute a draft for the next interim meeting. These papers concern the following chapters :

3.1 Weathering and translocation (Ms. E. Leclerc-Cessac & Mr. Y.H. Choi)

(i) Weathering. It should be decided if it would be possible to differentiate radionuclide forms such as cations, anions or metallic ones.

(ii) Translocation. The definition in the old TRS has to be taken again in order to consider only the radionuclides translocated to edible organs of the plants and not foliage. The use of translocation factors based on a period to harvest is absolutely needed for assessment of acute deposition even if for chronic phase this approach could be different. Such parameter values are currently being used by ECOSYS-87 (GSF) and ASTRAL (IRSN).

For these two chapters, Mr. Y.H. Choi proposed some values for Asian crops that should be integrated by Ms. E. Leclerc-Cessac by the next interim meeting.

3.2 Atmospheric resuspension of soil particles (Mr. F. Jourdain)

Due to some delay in the work, the draft subchapter is expected early next year. The influence of climatic conditions (wind, moisture, etc.) on secondary plants contamination as well as different behaviour between radionuclides as cations or anions (if important) should be clearly described. Some information has to be presented about rainsplash which is a possible way of secondary contamination of plants even if the impact is rather low, because of weathering and the usual cleaning of plants before consumption.

3.3 Radionuclide transfers in forest ecosystems (Mrs. Ph. Calmon & G. Zibold)

The first draft of the chapter, with some lacks, was prepared before the June meeting. Ecological half-lives could be examined for mushrooms related to different groups : saprophytes and symbiotic mushrooms. It has been found that geometric means for T_{ag} values are preferable to arithmetic ones. The uncertainty in the parameter values makes it difficult to reasonably group mushroom species in some fixed classes of radiocaesium transfer coefficients. Some more data about mushroom transfer coefficient are expected for the next meeting, also for strontium or other radionuclides where available.

As for berries, the appropriate text will be prepared by Mr. Ph. Calmon with the assistance of Ms. Aino Rantavaara before the next interim meeting.

Existing data for game are mainly being addressed to roe deer and caesium. The chapter must be equilibrated keeping the most important processes and values for other radionuclides than caesium should be included if possible. The biota working group will provide also parameter values for game which will complete this chapter.

Mr. Yves Thiry (SCK-CEN) offered to provide information to this chapter and to draft the contribution on radionuclide transfer to wood.

3.4 Transfer to rice (Ms. K. Tagami & Mrs. S. Uchida, Z. Shang, Y. Ho Choi)
Several contributions prepared by the above members of the WG were presented. The necessary option is to provide the compilation from individual contributions in order to prepare a draft chapter by the next meeting. This draft has to describe as clearly as possible the main features of the processes that occur for rice, and then to give tables of data that can be used to perform calculations.
Mr. P.R. Ravi, from India, offered to send to the group the data about rice for wet and dry cultivation of rice. These data will be sent to the relevant members of the WG in order to integrate them in this chapter.

3.5 Transfers to freshwater biota (Ms. T. Yankovich)
Database on transfers to freshwater biota has been presented. Key additions to the original TRS (1994) document were also highlighted. These include addition of transfer parameters on multiple exposure pathways, compilation of transfer parameters for fishes as well as other types of freshwater human dietary items (based on a literature survey that was conducted on human diet), consideration of food chain transfer and its influence of transfer to aquatic dietary items, and inclusion of information on dynamic transfer to freshwater biota. Collection of data is now achieved and draft text was provided for comment. This text was reviewed by Mr. J. Brittain of the Freshwater Working Group and will be updated for the next meeting to capture suggested changes, along with recommended parameter values. Mr. Z. Shang will send concentration parameter of some nuclides arising from laboratory tests in China.

3.6 Freshwater Kds (Mr. Ph. Ciffroy)
Mr. Ph. Ciffroy presented a review on freshwater Kds and presented a statistical method how to derive recommended values. This method is particularly interesting for those radionuclides that are extensively documented (Ag, Am, Co, Cs, I, Mn, Pu, Sr). For others, less documented radionuclides, this method is hardly applicable, but could provide some useful information. The option for further development accepted by the WG is to collect data on less studied radionuclides (see references in SRS 19) and where there are no data to propose analogue values. A draft is expected for the next interim meeting.

3.7 Vertical migration through top-soil (Ms. F. Strebl)
The first draft chapter was presented several weeks before and discussed in details within the meeting. This very interesting presentation provoked several comments. Perhaps, the place of this subchapter (for the time being it is located in the Agricultural chapter) has to be discussed in the future since agricultural soils are ploughed. Besides, vertical migration in agricultural soils should be also linked to soil Kds (see point 2.3, Kd subchapter by Mr. M. Vidal/Ms. A.Rigol), since it is the fundamental parameter for evaluation of radionuclide availability in soils. It is expected that the draft will be extended in terms of radionuclides and environments, a compilation of the information is not yet completed, but the text will be shortened.

4 – Chapters have to be drafted for the next meeting.

4.1 Soil-to-plant transfers (Ms. N. Sanzharova)
The preparation of the chapter was delayed because of the absence of volunteers. Upon active support of NAAL several persons were encouraged to provide the

contributions. Since mid of this year Ms. N. Sanzharova is in charge of the coordination of these efforts as well as of chapter drafting. The main problem is that the chapter requires renewal of the existing databases and elaboration of new ones more relevant for a purpose of the project that requires a big amount of man-powers.
Nevertheless, elaboration of these databases has started and the first results on creation of the database on soil-to-plant transfer factors (including compilation of the information) were presented by Ms. N. Sanzharova during the meeting.
It was important at this stage to specify the classifications of soils and plants as well as to harmonise them among various chapters where soil/plant grouping is of importance. To achieve this objective a task group on soil-to-plant transfers has been created during the week and two a half day meetings were organised. The group gathered N. Sanzharova, O. Shubina, N. Isamov, F. Strebl, H. Vandenhove, M. Vidal, A. Rigol, S. Fesenko, K. Tagami, F. Van Dorp and Y. Ho Choi). The group achieved the agreement about soil/plant classification that allows a finalising structure of the relevant database. It is expected that the literature information will be collated by April 2006, the work with the database having started in October this year, will be continued and the first estimates will be presented at the next interim meeting. It is also expected that the chapter will be drafted for spring next year, although numeric values in tables can be delayed at that stage.
It should be also mentioned that the Agency (NAAL) achieved some agreements with the relevant institution (IRSN, GRS) on the use of several databases on radionuclide transfer in the environment that may provide a contribution to this chapter.

4.2 Food processing (Mr. V. Kashparov / Mr. S. Fesenko)

Food processing is also the chapter where person in charge has been found with big delay with the support of NAAL. Fortunately, starting from autumn 2005 this activity was accelerated and some already existing results, as well as a work schedule for the activity within the chapter have been presented by Mr. S. Fesenko on behalf of Mr. V. Kasparov. It should be mentioned that the elaboration of the database on food processing coefficients has been started and it is expected that draft chapter including tables of parameter values will be presented well before the next interim meeting. Mrs. S. Uchida and S. Conney offered to provide the contributions to this chapter, which should be sent to Mr. V. Kashparov (and copied to Mr. S. Fesenko) in order to integrate them into the database.

4.3 Semi-natural ecosystems (other than forests)

The chapter is delayed. Up to now, no contributions were presented to this chapter. It is expected that some support can come from the ERICA project (via Nick Beresford), but the volunteer who could be in charge of this chapter drafting is urgently required. It was agreed that support for this chapter drafting will also be provided by NAAL through contacts with some relevant persons Mrs. V. Golikov (Arctic), P. Schulle (Antarctic), H. Lettner and Ms. A. Liland, who will be approached to be in charge of the chapter.

4.4 Transfer to animals and animal products (“biota working group”)

Brenda Howard and Nick Beresford presented a draft database on animal parameter values which will incorporate data from the NRPB ”Green database”, original TRS 364 references, Russian language literature, and other literature review (i.e. post 1991 or missing from Green database). Original references for all these sources need to be revisited. A workshop dedicated to animal transfers will be held at CEH-Lancaster from 7th to 9th of December. It will provide targeted inputs and novel data for the TRS. A draft for this chapter is expected for the next full EMRAS meeting. Colleagues who have data on animal transfers (especially from areas such as Asia which are underrepresented) are invited to send them to Brenda and Nick.

4.5 Physical processes in freshwater ecosystems ("freshwater working group")

The needs of the WG and the concepts of the revision of TRS 364 chapter on freshwater ecosystems concerning the physical processes in freshwater ecosystems were discussed with the Chairman of "freshwater" working group Mr. Luigi Monte. This point concerns hydraulic (dilution/diffusion) and the problematic of sedimentation/resuspension. Mr. Luigi Monte kindly offered the assistance of his group for the contribution to this chapter. The requirement is to describe as clearly as possible the main features of the processes that occur for freshwater ecosystems, and then to give tables of data that can be used to perform calculations. A draft is expected for the next interim meeting.

4.6 Tritium & carbon-14 ("^{3}H and ^{14}C working group")

The needs of the WG related to the revision of TRS 364 chapter on ^{3}H and ^{14}C in the environment were discussed with the Chairman of "^{3}H & ^{14}C" working group Mr. Phil Davis. Mr. Davis kindly offered the assistance of his group for the contribution to this chapter. He was requested to describe as clearly as possible the main features of the processes that occur for these two specific radionuclides, and then to give tables of data that can be used to perform calculations. A draft is expected for the next interim meeting.

We discussed the opportunity to have created separate chapters for some radionuclides (^{3}H, ^{14}C, ^{36}Cl). It was decided to present in only one separate chapter other modelling approaches for radionuclides such as ^{3}H, ^{14}C and ^{36}Cl), named "specific activity modelling".

N.B. : The original index of the new handbook will be reviewed taking into account the different discussions and agreement the group had during this meeting.

Work schedule and actions to be undertaken

Some actions have to be undertaken before the next interim meeting. These actions are mainly described in the individual chapters. Some extra efforts should be undertaken to provide better links with other Working groups in particular with "^{3}H and ^{14}C", "Freshwater" and "Doses to Biota" Working Groups.

The TRS 364 interim meeting will be held in Vienna the 2nd week of June 2006 (from Monday 12th to Friday 16th). The "Biota Working Group" will meet the same week from Monday 12th to Wednesday 14th. So, contributions from BWG leaders and participants could be arranged on 15th and 16th. The "Freshwater Working Group" will meet also the same week from 14th to 15th and Mr. Luigi Monte will join the TRS364 working group on Friday 16th in the morning. The meeting of "^{3}H and ^{14}C" Working Group most likely will be organised one week before, in Paris. Philippe Calmon and Sergey Fesenko will try to attend this meeting and will report to all participants about possible input from the above WG.

Concerning TRS364, a room is reserved in the Austria Center Vienna (ACV-U1-U-633-0) for 35 persons. Please note that this room is situated outside the IAEA headquarters. The preliminary agenda will be scheduled as follows :

- 12th-13th : chapters concerning exchanges between atmosphere, soil and plants
- 14th : Introductive chapters, Transfer to rice and Food processing
- 15th-16th : Transfer to animals, Forest and Semi-natural environments, Freshwater ecosystems, Specific activity modelling.

It would be highly welcome if the participants could attend the meeting during all the week.

Deadline for the presentation of new contributions

New contributions are requested to be presented before April 2006, in order to be able to make them circulate in the group and to be read by all the participants for the June meeting. However, it is not expected to receive completed drafts. Thus, these should contain the text in format close to the draft and planned tables. Nevertheless, actual values in these Tables can be admitted (or preliminary estimates can be presented).