EMRAS

Environmental Modelling for Radiation Safety
Working Group 4 – Model validation for radionuclide transport in the aquatic system "Watershed-River" and in estuaries

(IAEA)

3rd meeting

8-11 November 2004, IAEA, Vienna
International Centre, Vienna, Austria

MINUTES OF THE MEETING

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MINUTES OF THE MEETING

The third EMRAS WG 4 meeting was held in Vienna (Austria) and was hosted by the IAEA (International Atomic Energy Agency) in connection with the plenary meeting.

The objectives and aims of the WG meeting were to discuss the status of the work carried out and to plan further activities.

Scenario 1 – Floodplain (Chernobyl), prepared by Mark Zheleznyak and Alexei Konoplev

Gennady Laptev (UHMI) supplied some details concerning the empirical data relevant to the scenario that are of importance for the validation exercise. He also outlined the main processes that influence the exchange of radionuclides between the water column and the contaminated soils of the floodplain.

Further results from the exercise for modelling the behaviour of radiocaesium following the inundation of the heavily contaminated area object of the scenario were discussed and presented. The preparation of an internal report (working document) was planned. The structure of this internal report is as follows (in parentheses the name of the authors responsible for the preparation of the draft):

1. Introduction (Luigi Monte)
2. *Scenario description* (A. Konoplev, Mark Zheleznyak)
3. Previous experiences (Mark Zheleznyak)
4. Basic physical-chemical information (Gennadi Laptev)
5. Model description
   - 5.1. *Model from the University of Sevilla* (Raul Periañez)
   - 5.2. *MOIRA* (Luigi Monte)
   - 5.3. *Model from ENEA* (Luigi Monte)
6. Consideration of model features in view of the comparison of model results with the empirical data (Luigi Monte)
7. Countermeasures (Mark Zheleznyak)
8. *Comprehensive model sensitivity analysis* (Raul Periañez and Lars Håkanson)
9. Conclusions and recommendations (Luigi Monte)

(Sections for which a draft copy is ready are in italics).

The deadlines are as follows:

Scenario description – revision of measurement units (Bq), identification of primary experimental data, uncertainty ranges of empirical data – End of January 2005

Revised model results (including scenario 1999) – End of March 2005

Description of previous experiences – End of January 2005

Basic physical-chemical information – End of March 2005

Model descriptions (draft version ready)

Comprehensive model sensitivity analysis - End of March 2005

Countermeasures – End of March 2005

Conclusions and recommendations – End of April 2005

Preparation of a draft of the complete document – End of April 2005

Scenario 2 – The Techa River prepared by Ivan Kryshev and Alexander Kryshev (TYPHOON, Russia)

The draft of the description of scenario relevant to the long-term behaviour of Pu in the River Techa was discussed. The scenario is useful to evaluate state-of-the-art models in relation to their applicability to the complex environmental conditions following a major accident. More hydrological data will be supplied (end of February 2005). First results from modellers are expected before the end of June 2005.

Scenario 3 – Tritium in River Loire, prepared by Marilyne Luck and Nicole Goutal (EDF) –

The following modellers participated in this **blind test** exercise (the acronym of the model is in parentheses): Mark Zheleznyak (RODOS), Patrick Boyer (CASTEAUR), Luigi Monte (MOIRA), Marilyne Luck and Nicole Goutal (MASCARET)

The participants were asked to calculate the concentration of tritium as function of time at a specific point of the river (Anger). The source term was the time dependent controlled discharge of radionuclide into river water from four nuclear power plants at different locations.

As a first step the main features of each model were presented and discussed.

The results of the intercomparison were presented by Marilyne Luck and Nicole Goutal (EDF). It was recognised that the output of the four models were in good agreement with the empirical data. Such an agreement is surprisingly good if compared with the results of similar exercises that have been previously carried out for radionuclides, such as radiocaesium, that strongly interact with sediment and suspended matter. This result clearly shows that the dynamics of the migration mechanisms related to the water transport can be modelled with better accuracy than the processes controlling the complex interaction of dissolved contaminant with sediment particles. The empirical data that have been disclosed to the modellers will be distributed to the participants in order to allow them to better analyse the behaviour of the different models for a more detailed assessment of the model performances. It was recognised of importance to supply estimates of the uncertainty levels of the empirical data. For such a purpose, EDF will undertake appropriate actions.

Preliminary results of the exercise will be made available on the web.

The following actions were planned:

Action	From	To	Dead-line
Assessment of uncertainties of empirical data	EDF	Participants	End of March 2005
Short description of models (few pages)	Each participant	ENEA and EDF	End of March 2005
Assessment of results (a couple of pages)	Each participant	ENEA and EDF	End of March 2005
Short description of model improvements	Each participant	ENEA and EDF	End of March 2005
Preparation of a draft of an internal document	ENEA and EDF		End of June 2005

Further model validation exercises concerning other radionuclides in the River Loire were proposed. This point will be discussed in detail during the next working group meeting.

Scenario 4: Estuary of the Dniepr River contaminated with Sr-90 and Cs-137 from Chernobyl, prepared by Mark Zheleznyak and Vladimir Maderich (IMMSP, Ukraine)

The estuary scenario is of particular importance. No similar exerciseshave been carried out in the past. A preliminary draft of a document will be prepared by using the material produced by the participants.

Finally, participants were asked to suggest what issues, although worthy of attention, are not sufficiently accounted for by state-of-the-art models. It was recognised that it is of importance to account for the migration of daughter radionuclides through complex aquatic ecosystems.

TRS 364. The Watershed-Rivers-Estuaries WG interacted with TRS WG with regard to parameter values in aquatic systems. A draft outline of the main prosesses in aquatic modelling based on the assessments within the EVANET-HYDRA network has been prepared and new literature references provided. Philippe Ciffroy, EdF, responsible for the rivers part of the TRS, proposed an outline of various aspects of the aquatic chapter, as well as proposing a system for collecting data on K_d values. There was discussion concerning the value of K_d in state-of-the-art aquatic modelling and the need to accommodate other approaches in the TRS was emphasised.