The new IAEA’s programme on Environmental Modelling for Radiation Safety (EMRAS II): Historical context

1. IAEA VAMP Programme (1986-1999)

The acquisition of Chernobyl data sets justified in 1996 the establishment of an international programme aimed at collating data from different IAEA Member States and at co-ordinating work on new model testing studies. The possibilities for data acquisition and model testing in a "natural laboratory" were recognized at the Post-Accident Review Meeting, held in Vienna in August 1988. Following the recommendations of this meeting, the IAEA established a Coordinated Research Programme (CRP) on "Validation of Environmental Model Predictions" for the study of radionuclide transfer in terrestrial, aquatic and urban environments. It did not deal with models for atmospheric transport, but, instead, considered the interactions of accidents in the surface on terrestrial and aquatic environments. The principal objectives of the VAMP-Coordinated Research Programme were:

(i) To facilitate the validation of assessment models for radionuclide transfer in the terrestrial, aquatic and urban environments. It is envisaged that this will be achieved by acquiring suitable sets of environmental data from the results of the national research and monitoring programmes, established following the Chernobyl release.

(ii) To provide, if necessary, environmental monitoring and research efforts to acquire data for the validation of models used to assess the most significant radiological exposure pathways.

(iii) To produce a report to identify research needs and environmental model validation, including a review of the improvements achieved as a result of post-Chernobyl collaborative efforts and identifying the principal remaining areas of uncertainty in models used in radiation dose assessment processes.

(iv) To not "force" simulation for model validation selected for their importance in relation to radiation dose assessments. In selecting scenarios and processes for model validation it is necessary to bear in mind that there should be a demonstrable need to improve the reliability of predictions of radionuclide transfer in the pathways chosen.

VAMP therefore established four working groups on terrestrial, aquatic and urban multiple pathways. Since then, this was in line with the relationship between VAMP and the other international programmes (IUR: International Union of Radioecologists; BIOMOVS: Biogeochemical Modelling Validation Study), effort made to guarantee the exchange of information and avoid possible overlap.

2. IAEA BIOMASS Programme (1996-2002)

The IAEA programme on BioSphere Modelling and ASsessment (BIOMASS) was launched in Vienna in October 1996. The programme was concerned with developing and improving capabilities to predict the transfer of radionuclides in the environment. The programme had the following three themes:

Theme 1: Radioactive Waste Disposal. The objective was to develop a concept of a standard or reference biosphere for application to the assessment of the long-term safety of repositories for radioactive waste. Under the general heading of "Reference Biospheres", six Technical groups were established:

Task Group 1: Principles for the Definition of Critical and Other Exposure Groups

Task Group 2: Principles for the Application of Assessment Models

Task Group 3: Consideration of Alternative Assessment Contexts

Task Group 4: Biosphere System Identification and Characterisation

Task Group 5: Biosphere System Descriptions

Task Group 6: Model Development

Theme 2: Environmental Releases. BIOMASS provided an international forum for activities aimed at increasing the consistency in methods and models for the assessment of radionuclide release to the environment. Two Working Groups addressed issues concerned with the reconstruction of radionuclide releases detected by people from past releases of radionuclides from nuclear installations and the evaluation of the efficacy of remedial measures.

Theme 3: Biosphere Processes. The aim of this Theme was to improve capabilities for modelling the transfer of radionuclides in particular parts of the biosphere identified as being of potential radiological significance and where there were gaps in modelling approaches. This topic was explored using a range of methods including reviews of the literature, model intercomparison exercises and, where possible, model testing against independent sources of data.

Three Working Groups were established to examine the modelling of (1) long-term tritium diffusion in the environment; (2) radionuclide uptake by biota; and (3) radionuclide migration and accumulation in forest ecosystems.

The results of VAMP and BIOMASS are published in the IAEA documents as well as in other open literature publications.

3. IAEA EMRAS Programme (2002-2007)

The IAEA’s programme on Environmental Modelling for Radiation Safety (EMRAS) ran from 2002 to 2007. In contrast with the former VAMP and BIOMASS programmes EMRAS had the following general objectives:

(i) To improve model and modeling methods by model testing, comparison and other approaches.

(ii) To improve international consensus, where appropriate, on environmental modelling philosophies, approaches, and parameter values.

(iii) To identify new methods for the assessment of radionuclide transfer in the biosphere in areas where they did not exist already.

(iv) To provide testing facilities in the area of environmental assessment modeling for the exchange of information; and

(v) Assessment of environmental assessment modeling needs expressed by other international groups.

It is noted that a special feature of the IAEA’s modelling programmes in this area is the possibility of testing models using real environmental data. In many other contexts, models cannot be tested in this way and can only be partly tested or compared. For this topic, it has been given to make sure that the availability of environmental data during previous programmes. The Themes and Working Groups within the EMRAS programme were:

Theme 1: Radioactive Release Assessment

(i) To develop the IAEA Handbook of Parameter Values for the Prediction of Radionuclide Transfer in Temperate Environments (TR-364).

(ii) Model testing relating to countermeasures applied to the intake of iodine-131 from the Chernobyl accident.

(iii) Task Group 1: Assimilation of Iodine-131 from Iodine-depleted seawater.

(iv) Task Group 2: Development of models for the prediction of the behaviour of radionuclides in freshwater and marine environments.

Theme 2: Radiation Assessment

(i) Task Group 1: Development of models for the remediation of the urban environment; and

(ii) Task Group 2: Development of models to predict the behaviour of radionuclides in freshwater and marine environments.

The draft results of EMRAS are available at the EMRAS web page http://www-iaea.org/envirocenter/EMRAS/index.html and will be published soon.

4. IAEA EMRAS II Programme (2009-2011)

The IAEA has decided to continue its series of programmes on the improvement and development of national, international and regional assessment models (BIOMOVS, BIOMASS, VAMP, BIOMASS and EMRAS) with a new programme starting in January 2009.

The EMRAS II programme proposal documents’ outlines and summaries the improvement of the exchange of information and to be contained in the new programme and contains a provisional IAEA view on structure of the programme. The programme has been developed following discussions during the IAEA Conference on Environmental Radioactivity in April 2007, the final EMRAS Combined Meeting in November 2007 and the EMRAS Combined Meeting in December 2007 and a Consultants Meeting held in May 2008. The final structure of the EMRAS programme will take place 19–23 January 2009. A common theme to the proposed programme will be the development of reference assessment models.

Working Group 1: Reference and Guided Approaches for Assessing the Impact of Radionuclide Discharges

Target: Develop and test reference assessment models to provide for the exchange of information and to be contained in the new programme.

Working Group 2: Reference Approaches for Assessing the Downwindใส่ที่พิกัด

Target: Develop and test reference assessment models to provide for the exchange of information and to be contained in the new programme.

Working Group 3: Assessment after Emergency Situations

Target: Develop and test reference assessment models to provide for the exchange of information and to be contained in the new programme.