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# BIOMASS NEWSLETTER

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## BIOMASS: THE INTERNATIONAL ATOMIC ENERGY AGENCY PROGRAMME ON BIOSPHERE MODELLING AND ASSESSMENT

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### INTRODUCTION

This fourth Newsletter provides a summary of the main developments and progress in the BIOMASS programme including information from the Plenary Meeting held in Vienna 20-24 October 1997. The programme for the meeting was set out by Gordon Linsley (IAEA). Participants in the 3 BIOMASS Themes met separately during most of the week. However, all three Themes have interesting overlaps so Gordon Linsley specifically encouraged the various working groups to consult among themselves and with other outside groups. A number of

presentations of recent radiological assessment work within the IAEA were also included in the Agenda.

Participants were reminded that the overall BIOMASS programme is due to be completed by October 2000. The possibility of holding an IAEA symposium on Environmental Modelling during 2001 is under discussion.

Work is actively underway in all three Themes. In addition to the Working Group Sessions a number of interesting presentations were made at the Plenary Meeting. These are also summarised in this Newsletter.

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**Please note in your diaries: BIOMASS 1998 Plenary Meeting will  
be held in the week 5-9 October, at the IAEA in Vienna.**

## 1.- THEME ACTIVITIES

### THEME 1: RADIOACTIVE WASTE DISPOSAL (REFERENCE BIOSPHERES)

The current objective of Theme 1 is to develop the concept of "Reference Biospheres" into a practical system for application to the assessment of the long-term safety of repositories for radioactive waste.

There have been a number of interesting activities and developments, which have occurred in Theme 1 in the last few months. These include:

- drafting a document describing the concept of Reference Biospheres;
- the drafting of reports for each of Task Groups 1-4; and
- development of the work plans for Task Groups 5 and 6.

#### Concept of Reference Biospheres

One of the main objectives of BIOMASS Theme 1 is to provide support in the development of a logical and defensible safety case for solid radioactive waste disposal. Work is underway on developing a document which will present the BIOMASS view of the general principles concerning the concept of Reference Biospheres. During the Plenary Meeting Mike Egan (AEAT, UK) presented an analysis of comments received on the draft document. There was considerable discussion concerning terminology. However, there was strong agreement on the need for such a document to explain the background to reference biosphere developments. These suggestions will be incorporated into the next version of the document during a drafting meeting to be held at IAEA, Vienna from 12-16 January 1998. The final draft will be circulated at the end of January and the final report will be produced for distribution by the end of February 1998.

#### Task Groups

A summary of developments in each Theme 1 TG is given below. A document summarising Theme 1 discussions, work plans, actions and timeschedules has been produced and distributed,

following the BIOMASS plenary meeting in October 1997. For further information or copies contact Carlos Torres, (Scientific Secretary) the relevant TGL, or the Technical Secretariat (QuantiSci).

#### **Task Group 1: Critical Group Principles, TGL John Kessler (EPRI)**

The main focus of activity was the development of the contents for the TG report. John Kessler (EPRI) led discussions on a number of key issues including: the definition of human habits; when a reference exposure group should be used; whether habits should be limited to present day behaviour patterns; and whether children and infants should be included. A key issue is that no single group can be identified in advance as critical so a number of different exposure groups have to be considered. Any one of these could become the critical one according both to results for different scenarios for radionuclide migration through and release from the geosphere. Other important aspects which were discussed by participants were the application of habit survey information and the use of subsistence farming exposure groups. The report will also provide information on various statistical approaches to the presentation of data such as risk versus number of individuals at risk curves, deterministic or probabilistic use of data and methods to address the certain and uncertain components of critical group characteristics. In addition, a step by step procedure is being developed to assist with the identification of critical group(s) in performance assessments.

Discussion at the meeting added to the ideas presented and a number of participants agreed to provide data on the collection and interpretation of habit survey data. A request has also been made since the meeting for participants to provide updates to regulatory guidance on critical and exposure group definition made since the review completed within Appendix 2 of BIOMOVS II Technical Report No 6.

A set of comments on a draft IAEA document (produced by the WASSAC Sub-Group on Principles and Criteria for Disposal) on critical groups and biospheres has been prepared and sent to the relevant sub-group chairman. These

comments were provided by BIOMASS participants.

A draft TG report is due to be completed by the end of March 1998 and the final report will be distributed after the Spring WG meeting.

### **Task Group 2: Data Principles, TGL Pascal Santucci (IPSN)**

The objectives of TG 2 are: to develop a protocol for the selection of data for use in performance assessments, and to provide an illustration of the methodology. The Task Group Leader (P. Santucci, IPSN, France) has provided two documents as the basis of the work. The first is a draft Task Group report which outlines the various aspects which have to be considered in the data elicitation process. Parts of this report are still being worked upon and it will be finalised during the next six months.

The second paper was prepared for discussion at the recent Plenary Meeting in Vienna. It sets out a proposed work programme for developing a protocol for data elicitation exercises which have to be performed as part of performance assessments for geological disposals of radioactive wastes. The protocol once developed will be independent of data type. At the Vienna meeting it was agreed that the BIOMOVIS II Complementary Studies specifications will form the initial information for testing the protocol.

Discussions at the meeting revolved around the following topics: data classification; criteria for classification; influence of assessment context components; exposure group definitions and systems descriptions on data selection; sensitivity analysis methods; data elicitation and use of expert judgement; data structuring and conditioning; criteria for utilising generic versus site specific data; how to deal with different temporal and spatial scales; how to achieve consistency between data for other parts of an assessment context (e.g. for geosphere); and how modelling requirements impacts on data use. Some key documents on data elicitation procedures which have been produced for previous performance assessment exercises (e.g. UK Dry Run 3) will provide useful information.

### **Task Group 3: Alternative Assessment Contexts, TGL Morimasa Naito (PNC)**

A third version of the draft report had been prepared and circulated previously so at the October Plenary meeting, Morimasa Naito (PNC) presented detailed comments on a draft TG report which included proposals for assessment contexts to be investigated further within the BIOMASS work programme. Comments had focused on the following aspects: system optimisation; non-human biota; quality assurance aspects; human intrusion or other disruptive releases; assessment philosophy in relation to levels of confidence required; use of other performance indicators; and questions concerning radiation environment standards. The proposals were developed to support illustration of the effect of assessment context on biosphere modelling requirements (in terms of level of detail as well as technical content), but also to provide a basis for development of example reference biospheres. They are intended to provide a useful set, starting with a relatively limited context and going through increasingly complicated cases finally involving detailed consideration of environmental change. It is not assumed that any particular example is more valuable than another. That will depend on the user. Participants also discussed how to improve descriptions of the alternative assessment contexts examples provided in the TG report and further work will be undertaken to extend the different assessment context descriptions.

A final TG report explaining the components and significance of an assessment context and a number of different examples to be considered within the BIOMASS programme is due to be completed in the Spring of 1998.

### **Task Group 4: Biosphere System Identification and Justification, TGL Marianne Menut (ANDRA)**

TG 4 participants met during the Vienna Plenary meeting to discuss:

- the TG 4 draft report issued in July 97; and
- the Group's future work programme.

In general, participants considered that the draft report provided a very useful basis for the development of an approach to identify biosphere systems. However, it was felt that certain improvements were required to the clarity and structure of the text and that a focus on practicalities also needed to be introduced. Possible improvements to the report were discussed and provisionally agreed by the Group. These included the production of a figure to illustrate the proposed approach to be used for biosphere system identification and justification, the clarification of what is meant by "biosphere system", and a listing of the biosphere system's components.

An outline work programme up to the end of June 1998 was devised. Following the issue of version 2 of the TG 4 report there will be a Group meeting from 9 to 12 February 1998 in Henley-on-Thames, (Henley is about one hour by bus from London Heathrow airport). The aim of the meeting will be:

- to review version 2; and
- to use the approach developed by the Group to identify and justify biosphere systems for the Assessment Context examples produced by TG 3.

Anyone interested in attending the meeting should contact Richard Little at QuantiSci by 23 January 1998 (see address below). It is envisaged that a final version of the TG 4 report will be produced by the end of June 1998.

### **Task Group 5: Biosphere System Description, TGL Paloma Pinedo (DIAE/CIEMAT)**

The aim of this TG is to provide practical, self-consistent, stylised descriptions of biosphere systems for the different assessment contexts (see TG3). Paloma Pinedo outlined the work to be undertaken by the group to produce a procedure to describe biosphere systems, taking as input the work from TG4 and providing input to the task of model development, TG6. The procedure includes iteration within a series of steps, intended to provide a proper justification for what is included within the system description. In particular, several questions need to be answered, namely should the system description be: constant or

variable with time; dependent or independent of location, assessment assumptions, human activities and radionuclide release levels; how should the system characteristics be given; and what components should be included/excluded?

During the week initial ideas and proposals were presented as to how to produce system descriptions in practice that would be coherent with the assessment premises. The proposals covered two aspects: (1) a generic and common structure for any description of a biosphere system, and (2) a procedure that would allow identification of the set of components required for a consequence assessment. Application of this procedure to a series of Assessment Context Examples will allow formulation of conclusions about the possible description of a Reference System.

It is proposed that the System Description is structured under the following headings: edaphology; hydrology; biotic characteristics; and human activities and the use of natural resources.

An eight-step procedure was suggested and participants are asked to review these suggestions and consider how to apply them to produce a system description for the first Assessment Context Example - the Drinking Water Well.

### **Task Group 6: Biosphere Modelling, TGL Mike Egan (AEA Technology)**

The main work programme is still in the planning stage. TGs 1-5 will all have important interactions with this group and the work of incorporating them into model development for the example reference biospheres is due to be carried out within TG6. A planning meeting for this work is due to take place in Vienna, 12-16 January 1998.

Comments, questions or information on any of the above Theme 1 activities should be addressed either to the Working Group Leaders or to the Scientific Secretary:

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## THEME 2: ENVIRONMENTAL RELEASES

Both Theme 2 working groups, on Remediation Assessment and Dose Reconstruction, held their respective meetings during the BIOMASS Plenary week in October 1997 in Vienna. The meetings were organized one after the other because most of the modellers interested in modelling environmental releases are involved in both groups. It was decided to continue that practice and the intersessional meeting of Theme 2 will be held from 8 to 12 June 1998 in Veszprém, Hungary.

### Remediation Assessment Working Group WGL Lieve Sweeck SCK/CEN

The first test scenario of the Remediation Assessment Working Group is the **Olen scenario**. The modelling task concerns the remediation of a 100 ha area contaminated by Ra-226 as a result of radium extraction activities in St. Jozef-Olen, Belgium. Two scenarios are being considered, a **Type A** and a **Type B** scenario, as described in BIOMASS Newsletter 2. In the Type A scenario, the influence of a remedial action, that had been carried out in the past (deep ploughing), on the Ra-226 contamination of milk (cow milk) is to be assessed and the modelling results are compared with measured values. The results were discussed at the Vienna meeting and some interesting conclusions were drawn. Analysis of the results

indicated that the predicted Ra-226 concentrations in milk were generally higher than the observed concentrations. There is a strong belief among the participants that the reason for that may be the underestimation by the models of the effectiveness of deep ploughing.

A draft report of the Type A scenario will be prepared before the next working group meeting.

The objective of the Type B scenario is to assess the effectiveness of potentially feasible remedial actions and to compare the respective modelling results. At the Vienna meeting, two remedial actions were selected for modelling. The first is the removal of the soil from the most contaminated areas, the second is capping the contaminated soil with a clean soil layer. The scenario description has been delivered to those who were known to be potentially interested in the scenario. At the next meeting, preliminary results of the Type B modelling task will be discussed.

It is still possible to join the modelling of the Olen scenarios. The deadline for submitting results for the Type A scenario is 31 January 1998 and for the Type B 15 April 1998. If you are interested, please contact either the Working Group Leader Lieve Sweeck or the scientific secretary Kirsti-Liisa Sjoebloom.

### Dose Reconstruction Working Group WGL Kathleen Thissen, SENES

At the Vienna meeting the Dose Reconstruction Working Group continued its discussion on the **Hanford scenario**, which deals with an historical release of I-131 from the Hanford nuclear chemical separations plant in Washington, USA and the consequent environmental concentrations, exposures, and doses at several locations. In all, model predictions from six participants were compared with measured data and with calculations made by the originators of the data. Four participants submitted revised or additional results since the June working group meeting, and two participants submitted predictions for the first time. A number of different approaches were used, giving opportunity for much discussion.

In general, the largest differences in approaches and results occurred for the predictions of I-131

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deposition, as this endpoint was dependent on the modelling of atmospheric transport (one modeller estimated deposition from available measured concentrations of I-131 in vegetation). Uncertainties in the atmospheric transport could easily be a factor of 50 in several cases. Predicted values of deposition at some target sites (locations of actual residences at the time of the release) were within a factor of 5 of each other, while at other sites, the range of predictions approached 2 orders of magnitude. For the other endpoints, predictions normalized for deposition were generally within an order of magnitude or less across participants, with the differences in normalized predictions primarily due to differences in the parameter values selected for various processes. The range of results obtained for deposition reflects the difficulty of predicting site-specific results for a complex meteorological and topological situation, especially for large distances from the release point.

A draft report for the Hanford scenario was distributed and discussed. The target is to complete the report at the June 1998 working group meeting.

Several possible scenarios were considered for new modelling efforts. The decision was made to use the Iput River scenario, which involve predictions of aquatic transport and exposure pathways, as well as agricultural pathways, of Cs-137 from Chernobyl. The effects of countermeasures that were instituted in the region will also be incorporated in the modelling task. The modelling endpoints will extend to human whole body concentrations and internal and external doses.

Initial calculations for the Iput River Scenario will be discussed at the intersessional meeting of the working group in June, but the test data will not be disclosed. Participants are requested to submit initial predictions to the Kirsti-Liisa Sjoebloom by 30 April 1998.

If you are interested in modelling the Iput scenario and have not yet received the scenario description please contact Kirsti-Liisa Sjoebloom.

Comments, questions and requests related to the Theme 2 activities should be addressed to the

respective working group leaders or to the scientific secretary:

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### Dose Reconstruction Working Group

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## THEME 3: BIOSPHERE PROCESSES

### Tritium Working Group, WGL Yves Belot (IPSN)

Technical discussions at the October Plenary Meeting were centered around the following objectives:

- to discuss the results of calculations for Scenario 1.1 and agree further refinements of the scenario in the light of the results;

- to discuss Scenario 2.01 and agree modifications required prior to calculations being performed;
- to discuss experimental work already undertaken and new experiments to be conducted to provide data for model testing;
- to agree a work plan, time schedule, agreed actions and potential arrangements for a Spring 1998 TWG meeting.

### Scenario 1

This is concerned with modelling of the steady-state behaviour of tritium in the environment when atmospheric releases are assumed to be on average nearly constant and a steady-state equilibrium has been reached. Ten sets of calculations were submitted after the Spring meeting and these results were analysed. For the assumed HTO or HT release, results for concentrations in air and soil could be seen to fall into one of two sets - either where the modeller included re-emission following primary deposition, or where no re-emission was calculated. The approach to modelling wet and dry deposition and the question of whether re-emission is included in calculations are crucial for modelling tritium concentrations in subsequent environmental compartments. For the part of the Scenario which deals with aquifer concentrations of HTO following deposition from the atmosphere, two different modelling approaches were used, namely: a Gaussian plume or puff model; or a finite difference model. It will be useful to compare the results from the different modelling approaches and to evaluate the use of 2-D or 3-D models.

Required modifications for the Scenario were agreed and these will be incorporated in a new version (V.1.2) to be distributed at the end of December 1997.

### Scenario 2

This Scenario considers the modelling of tritium transport above a near-surface watertable under realistic weather conditions. Discussions centred around how to improve the scenario description. The revised version (V. 2.1) will be issued in

December 1997 for calculations to begin early in 1998.

### Experimental Work and Data Sources

Colleagues from CEA/DASE (France), RFNC-VNIIEF (Russian Federation) and AECL (Canada) are either planning, or have undertaken, experimental work which can be used for testing some of the modelling approaches used.

CEA/DASE experiments will provide information firstly on tritium concentrations in soil following routine releases over a one year period; secondly on the washout of plume HTO; and thirdly on tritium transport in the unsaturated zone. It is hoped that some experiments be undertaken in collaboration with German researchers.

Data on the long-term behaviour of tritium in the environment collated by Russian colleagues will be used as a basis for a new scenario. This will be developed during the forthcoming Spring 1998 WG meeting.

Another new scenario is planned for development at the Spring WG meeting. This will be based on data obtained from Canadian studies at the CANDU reactor sites. The aim will be to compare model predictions for tritium concentrations in rain water, soil water and plant tissue water with the field data.

Colleagues from FzK (Germany) and Imperial College (England) also provided summaries of information and data from recently conducted experiments on OBT formation in plants and tritium uptake by different food crops.

### Future Work Plan

A work plan for the activities of the Tritium Working Group was devised during the meeting. Information on this, actions, time schedules, and the forthcoming Spring WG meeting objectives have been provided in the summary notes of the October meeting which is available from Yoshikazu Inoue (IAEA Scientific Secretary) or the Technical Secretariat (QuantiSci).

**Fruits Working Group, WGL Franca Carini (Universita Cattolica del Sacro Cuore)**

It has been widely recognized in the last years that, notwithstanding the importance of the fruit pathway, information on the behaviour of radionuclides in plants bearing fruits is very scarce.

There were a number of instances within the IAEA VAMP (Validation of Environmental Model Predictions) project (1988-1994), where uncertainties associated with transfer to fruit were highlighted both in the Terrestrial Working Group and in the Multiple Pathways Assessment Working Group. The IAEA/FAO Co-ordinated Research Project (1992-1997) in co-operation with IUR on "Radionuclide Transfer from Air, Soil and Freshwater to the Foodchain of Man in Tropical and Sub-tropical Environments" collected many transfer parameters of fruits from tropical and subtropical environments, concluding that data on fruit is still insufficient to reveal trends of the contamination.

The IUR Task Force concerned with "Radionuclide Transfer in Semi-Natural Ecosystems" also recognized the significance of transfer to fruits. As a consequence a formal IUR Task Force (TF9) on radionuclide transfer to fruits was established in late 1996 to promote interest in this subject.

Recently it was proposed to tie together the IAEA and IUR interest on the transfer of radionuclides to fruits. As a result, a planning meeting was held at IAEA, Vienna, from 8 to 10 September 1997. During the meeting a "Fruits Working Group" was established within the IAEA's Biosphere Modelling and Assessment Methods Programme (BIOMASS), Theme 3, in co-operation with the IUR. The scope and objectives of the group were established and a work programme was developed. A copy can be obtained from the TGL, or Yoshikazu Inoue, the Scientific Secretary.

**Objectives of the Fruits Working Group**

The scope of the Fruits Working Group (FWG) is to improve understanding of the uptake and

transfer of radionuclides, both anthropogenic and natural, to fruit.

The aim of the FWG is to reduce the uncertainties associated with modelling the transfer of radionuclides to fruit and thereby to improve the robustness of the models that are used for radiological assessment and to increase the confidence with which they are applied. Emphasis will be placed on those radionuclides and pathways that are identified as having the greatest significance. A combination of modelling and experimental techniques will be used to obtain maximum benefits from research and modelling, not only in the field of radioecology, but also in related fields.

The overall objective will be met by a programme of work with the following subsidiary objectives:

1. To bring together modellers and experimentalists in the field of radionuclide transfer to fruits to allow for the exchange of information and peer review.
2. To review what has been done in this and related fields with respect to research, development and application of models, and specification of data for application to radiological assessments.
3. To develop a database of model parameters in conjunction with existing IUR activities in this field.
4. To undertake model intercomparisons to identify and investigate significant areas of uncertainty and differences in approach.
5. To identify, encourage and co-ordinate additional experimental studies on the transfer of radionuclides to fruit so as to maximise the benefits of current or new experimental research in this field.
6. Where possible and practicable, to undertake testing and validation of existing or new models against independent datasets.

The programme of work will address what has been and is being done in the field of transfer of radionuclides to fruit. The WG will encourage new experimental work and will provide independent testing and validation of the models that currently exist and/or are under development.

The Working Group programme has been developed to operate over a three year period, from October 1997 to October 2000. Modellers and experimentalists will meet during six-monthly WG meetings (October and April).

### First Meeting of the Fruits Working Group

The first meeting of the joint IAEA/IUR Fruits Working Group was held at IAEA, 20-24 October 1997, in the framework of the BIOMASS plenary meeting.

The aim of the first WG meeting was:

- to receive information on new or recent experimental and modelling studies;
- to initiate the review process;
- to establish the forward programme.

### Presentation of New or Recent Studies

The first sessions of the meeting were devoted to presentations on experimental and modelling studies in which the participants were involved or which had been recently completed by them or by colleagues. Nine lectures were presented on the following topics: wet and dry deposition; interception; loss; foliar absorption; root uptake; translocation to fruit and storage organs; ECOSYS, FARMLAND and SPADE models.

Topics of potential concern for the transfer of radionuclides to fruit identified during discussion are as follows: changing sink strength in the plant during the growing season; the influence of climatic conditions in different years; the effect of plant morphology (in particular for trees) on interception by different species in different countries; the dependence of uptake by foliage on the availability of radionuclides at leaf surface; the use of data for fruit models.

### IUR Database

Information was provided on a draft record structure for the IUR database to be used for collation of data from which to derive model parameters.

### Scope of the Review

It is intended that data, parameters and models from related fields, such as pollution by heavy metals and pesticides, will be reviewed during this study.

Specific review elements were allocated to participants as:

- dietary components;
- significant radionuclides and speciation;
- aerial pathways;
- foliar uptake;
- root uptake;
- role of micro-organisms in root and leaf uptake;
- models and data requirements;
- storage and processing of fruit;
- crop characteristics and growing patterns.

A draft of the review will be discussed during the next WG meeting in April 1998.

### Questionnaire

A questionnaire was designed for circulation among groups and individuals with an interest in the contamination of fruits. Questions were designed to identify supporting information for the review and to help identify data requirements. Responses to the questionnaire are requested by December.

### Next Meeting

Arrangements for the next meeting have been discussed. It is intended to hold it in the UK in April 1998.

Purpose of the meeting:

- discuss the draft report on the review;
- discuss the results of the questionnaire;
- establish scenarios for the inter-comparisons;
- identify datasets for the validation work;
- review protocols for proposed experimental studies.

Comments, questions or information on Tritium Modelling and Fruit trees WGs should be addressed to the WGLs or the Scientific Secretary:

## 2. PRESENTATIONS AT THE OCTOBER PLENARY MEETING

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### Forests Working Group

A proposal was presented for a new WG focused on modelling of the behaviour of contaminants in forests. Thomas Riesen (PSI, Switzerland) outlined a suggested work programme which would cover the following topics:

- data review;
- review of models;
- construction of a database.

As with the Fruits WG, there will be close collaboration with the IUR.

The BIOMASS Co-ordinating Committee approved the setting up of the group. Some sponsorship has been found but interest from any other organisations willing to sponsor the WG activities would be welcomed. A meeting in Vienna in March 1998 will be planned in order to agree the work scope, objectives and approaches.

Comments, questions or information on Forest WG should be addressed to Mr Gordon Linsley or Carlos Torres (IAEA):

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### IAEA Radiological Assessment Work

An introduction on the activities of the IAEA was given by Abel Gonzalez, director of the Waste Safety Section. The IAEA promotes the development of the safe utilisation of nuclear energy and its by-products by:

- facilitating binding agreements among States, such as international conventions, as well as the implementation of these agreements;
- establishing international safety standards;
- providing for the application of these standards through:
  - exchange of information;
  - training;
  - technical co-operation;
  - research and development;
  - services.

Thereafter the following papers were presented as examples of IAEA Radiological Assessment Projects:

- Radiological Safety of the nuclear test sites at the Mururoa and Fangataufa Atolls (R Fry).
- Radiological Conditions at Bikini Atoll: Prospects for resettlement (G Linsley).
- Radiological Conditions at the Semipalatinsk Nuclear Test Site in Kazakhstan (P Stegnar).
- Results and Discussion of the International Arctic Seas Assessment Project (K-L Sjoebloom).

For information on any of these topics, please contact the IAEA.

### UNSCEAR Activities on Environmental Modelling (B. Bennett)

The main objective of UNSCEAR is to publish reference documents on the sources and effects of ionising radiation. The next report is due to be published in 2000. Exposures from natural, man-made, medical and occupational sources are evaluated. The following effects are considered:

epidemiological, mechanistic and hereditary. Previous UNSCEAR Reports have concentrated on the effects on humans, but the 1996 report included the effect of radiation on the environment.

The 2000 Report will also focus on reviewing methods for dose evaluation. This does not include a review of modelling parameters, but UNSCEAR is nevertheless interested in the following:

- General reviews on modelling, e.g. fruit consumption. Data on the Asian diet will be especially welcome.
- There is a need to know more detail on fish and seafood, also game and mushroom, even though the latter is applicable only to a small group. Drinking water consumption also needs to be known.

### Future Activities

Previous UNSCEAR reports focused almost exclusively on exposure to adults. Future reports will probably evaluate age dependent results. Differences between indoor/outdoor activities (e.g. farm workers vs office workers) will also be considered.

There is a need to get consensus on regional issues, as the next step for UNSCEAR is to go regional. Different scenarios will be considered, for instance, continuous release during the year as opposed to various intense releases during different times of the year (with references to agriculture). Various water bodies such as lakes, oceans, etc also need to be considered.

### 2000 Report

Draft copies of the 2000 Report are available for review and comment, but not for general use.

### IUR Activities

Peter Coughtrey (Mouchel Consulting) gave a short summary of recent achievements of the IUR task forces on:

- assessment of relative importance of freshwater exposure pathways;

- semi-natural systems;
- less commonly considered radionuclides;
- effects of radionuclides on natural organisms.

The IUR have current Action Groups on models and data, ecological effects, as well as a modelling database.

### Models and Data

This group evaluate results on distribution and transport in the environment, especially semi-natural ecosystems. A questionnaire is being circulated. The Group will meet at the end of November to consider the response to the questionnaire and to prioritise further research.

### Ecological Effects

The work being conducted on forests may be of relevance to Theme 3 (or Theme 1) of BIOMASS. The significance of various pathways is being studied, as well as possible ways of modelling these pathways.

### Modelling Database

This task group is sponsored by MAFF (UK) and is constructing a database that describes the time-dependent behaviour of radionuclides.

Future activities of the IUR will focus on:

1. Comparative studies on the behaviour of radionuclides under different climatic conditions.
2. Development of analytical methods.
3. Remediation and restoration.
4. Variant (semi-natural) ecosystems.
5. Integration of feedback with related sciences.

## 3. OTHER INFORMATION

### BIOMASS on the World Wide Web

The IAEA has expanded the Nuclear Safety pages available at its World Wide Web site to include a section devoted to Radiation and Waste Safety (RASANET) at:

<http://www.iaea.org/ns/rasnet/>

Malcolm Crick introduced RASANET during the Vienna Plenary meeting and demonstrated the associated pages. It is planned that BIOMASS pages will be introduced during 1998 into RASANET to provide information concerning the general BIOMASS programme, the three Themes and their associated Working/Task Groups. Information relating to the background, objectives and scope, current status and contact points for further information will be provided.

**BIOMASS Co-ordinating Committee Meeting**

This Committee includes Pascal Santucci (Theme 1), Kathy Thiessen (Theme 2), Theo Zeevaert (Theme 2), Henri Camus (Theme 3), Ben Walters (Theme 3), Carlos Torres (IAEA) and Gordon Linsley (IAEA - Chairman).

It was agreed that good progress is being made and the members were satisfied with the arrangements as they affected the task groups and working groups for which they had interest. The issue of future annual BIOMASS meetings and the time to be allotted to special plenary sessions was discussed. For some Task Groups there had not been sufficient time to complete their work during the week of the meeting and it was felt by some participants that less time should have been given to the two mid-week plenary sessions. These comments will have to be borne in mind when planning next year's Plenary meeting; the emphasis must be on achieving the goals set for BIOMASS.

The proposal for a Forests Working Group had been well received. There is sufficient support from the participants and the technical content of the proposal had been modified in the course of the week to emphasize model testing so that it is, in principle, achievable and potentially useful and does not, as far as we are aware, duplicate any other international work going on at the present time.

It is now probably appropriate to end any further consideration of possible projects for inclusion in BIOMASS because it is unlikely that there would be enough time to complete them within the BIOMASS timeframe, and also because any

further increases in the size of the programme would be difficult to manage.

**Theme 1 Steering Committee Meeting**

The chairperson for the period October 1997 to October 1998 is Pascal Santucci (IPSN, France).

The Steering Committee discussed mainly budgetary matters. Because the Theme 1 work is still generally at the developmental stage, the Committee decided that there should be no presentations on BIOMASS Theme 1 work at international meetings outside the IAEA until 1999.

#### 4. SUMMARY OF SPRING '98 MEETING INFORMATION

A number of meetings will be held during Spring 1998 to further the various work programmes. The following table summarises this information. Please note that for some WGs, exact dates have not been finalised yet. Details of meeting arrangements will be provided nearer the time.

##### Spring WG Meeting Information

Major Spring '98 WG Meeting Information		
Working Group	Place	Date 1998
<b>Theme 1</b>		
• Task Group 4 Meeting	Henley, UK	9-12 February (confirmed)
• All Task Groups	Vienna	4-7 May (confirmed)
<b>Theme 2</b>		
• Dose Reconstruction WG	Joint meeting in Veszprem, Hungary	8-12 June (confirmed)
• Remediation Assessment WG	"	"
<b>Theme 3</b>		
• Tritium WG	AECL, Chalk River, Canada	11-15 May (confirmed)
• Fruits WG	England	April (dates to be finalised)
• Forests (Planning Meeting)	Vienna	(dates to be finalised)

**DONT FORGET: 1998 BIOMASS Plenary Meeting  
will be held 5-9 October, at the IAEA in Vienna.**