

BIOMASS NEWSLETTER

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THE INTERNATIONAL ATOMIC ENERGY AGENCY PROGRAMME ON BIOSPHERE MODELLING AND ASSESSMENT

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The year 1999 is proving to be a very active one for the BIOMASS project. Seven working group meetings have already been held since the beginning of the year involving around eighty (80) experts on Biosphere modelling and assessment. The **BIOMASS Theme 1** (Reference Biospheres for Long-Term Discharges Assessment) met twice, in February in Henley-on-Thames (UK) and in May in Madrid (Spain). **Theme 2** Working Groups (Dose Reconstruction and Remediation Assessment) met in Vienna in June. Three meetings were organised within the work of **BIOMASS Theme 3** (Biosphere Processes). The Fruit Working Group met in May in Athens (Greece), the Forest Modelling Group in April in Stockholm (Sweden) and the Tritium Modelling Working Group met in May in Sarov (Russia).

The IAEA is making an effort to ensure that documentation of the project is completed by the end of BIOMASS. As part of this process ten (10) BIOMASS Working Documents are being edited as IAEA Working Material (see Section 5). The documents will be ready for the next BIOMASS Plenary meeting, 4-8 October 1999. The first of these documents is enclosed with this newsletter.

This newsletter summarises the progress made by each BIOMASS Working Group since January 1999. The editorial note (Section 4) contains references to IAEA work relevant and important for the BIOMASS project.

Preliminary AGENDA for the IAEA BIOMASS Plenary and Working Group Meetings, IAEA Headquarters, Vienna, 4-8 October 1999

Monday	Theme 1, Reference Biospheres (C07VI,C0751,C0753) Remediation Assessment (C0741) Fruits Working Group (C0251)
Tuesday	Theme 1, Reference Biospheres (C07VI,C0751,C0753) Remediation Assessment (C0741) Fruits Working Group (C0251)
Wednesday	BIOMASS Plenary sessions (IAEA Boardroom) and Reception
Thursday	Theme 1, Reference Biospheres (C07VI,C0751,C0753) Dose Reconstruction (C0741) Tritium Working Group (C0453) Forest Working Group (C0251)
Friday	Theme 1, Reference Biospheres (C07VI,C0751,C0753) Dose Reconstruction (C0741) Tritium Working Group (C0453) Forest Working Group (C0251)

BIOMASS Publications in International Events and Scientific Magazines

The BIOMASS Co-ordinating Committee approved at its last meeting (October 1998) the publication of the activities and provisional results of the Fruit Modelling WG in a Scientific Magazine. The Committee strongly supported this initiative. The Committee will discuss the BIOMASS policy for publication of papers at its next meeting in Vienna on Friday, 8 October 1999. Before we have a BIOMASS policy on this subject, we would appreciate it if you could copy to us (Mr. C. Torres, address on page 13 of this newsletter) your papers on your scientific work that are related to BIOMASS themes prior to publication. A reference to such papers will be made regularly in this newsletter (see Section 5) for the information of other participants.

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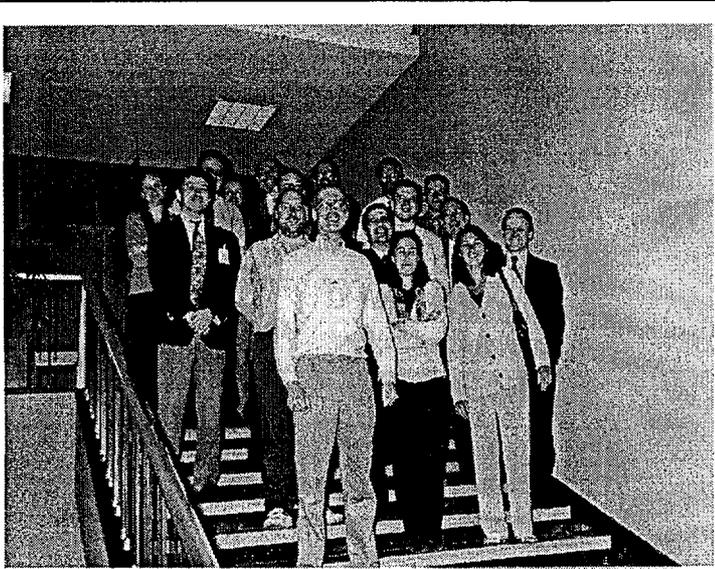
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IMPORTANT DATES:

30 August- 3 September 1999, BIOMASS Theme 1 Meeting. NRC Headquarters, Washington, USA.

4 - 8 October 1999, BIOMASS 1999 Plenary Meeting. IAEA Headquarters, Vienna, Austria. At the end of this newsletter you can find the meeting registration form.

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



CIEMAT research centre (Spain) hosted one of the BIOMASS Theme 1 meetings. Mr. Cancio and Ms. Pinedo did an excellent job. The working atmosphere was perfect, congratulations. Thanks also to our BIOMASS Theme 1 sponsors: ANDRA and IPSN (France), NIREX and BNFL (UK), PNC (Japan), CIEMAT and ENRESA (Spain) and NAGRA (Switzerland).

General Theme 1 Developments. The spring meeting of Theme 1 took place 17–21 May in Madrid, hosted by CIEMAT. The overall objective was continued development of Example Reference Biospheres and the augmentation of the methodology. Participation included representatives from 19 organisations and 9 countries. Interest in this subject area continues to grow to the extent that over 200 people from relevant operators, regulatory bodies, research bodies and other organisations have directly requested to be kept informed, and a great many of them have contributed with input to or useful commentary on draft working material. It is a major task to handle so much material; however, the value in achieving a common understanding of the issues makes the effort worthwhile.

To date, two Working Documents have been issued by Theme 1: WD1 describes the Reference Biosphere Concept, and WD2 describes Alternative Assessment Contexts within which biosphere assessments for waste disposal facilities may have to be developed. In short, it is concluded that no single reference assumption is likely to meet the assessment needs for the wide variety of circumstances that can arise in different facilities, for different wastes within different regulatory systems. Thus, Theme 1 is developing a

series of Reference Biospheres of increasing complexity with the intent to provide practical and useful examples which could be used in different circumstances and for different purposes. In addition, through the documentation of those examples, there is an important objective to provide a demonstration of the methodology for creating more specific examples.

These WDs are intended for use now and can be referenced as IAEA Working Material. However, they do not represent the final output from Theme 1. Comments are welcomed and will be taken into account in the final BIOMASS Theme 1 documentation.

The status of further Theme 1 WDs and the actions leading up to the BIOMASS Plenary meeting in October are set out below.

The May meeting provided the opportunity for a final review of the draft WD on **Definition of Critical and Other Hypothetical Exposure Groups**. This will be issued as WD3 this month. The meeting also discussed further work in this area, primarily aimed at application of this guidance to the Example Reference Biospheres and the interface between biosphere system description and exposure group definition, see below.

A near final draft WD has been prepared describing a protocol on the **Application of Data** to assessments. The protocol is being used in the justification of the choice of assumptions for parameter values, such as water consumption rates and soil-water distribution coefficients, to be used in the example reference biospheres. The final version will be distributed this summer as WD4, following completion of the current review.

Further technical notes have been produced to better **Identify and Justify Biosphere Systems** and the corresponding **Biosphere System Descriptions**. Experience gained from the very simple Example 1 Reference Biosphere (concerned with well water abstraction and use for drinking water supply) is being applied to Example 2A. Since this Example allows for a wide variety of transport and exposure pathways associated with well water use, this is more complicated. The May meeting also began development of the biosphere justification and description for further Examples, see below. The links between this work and conceptual model development were discussed, especially as regards to the justification for excluding unwarranted detail. The importance of iterative work to provide such justification was recognised.

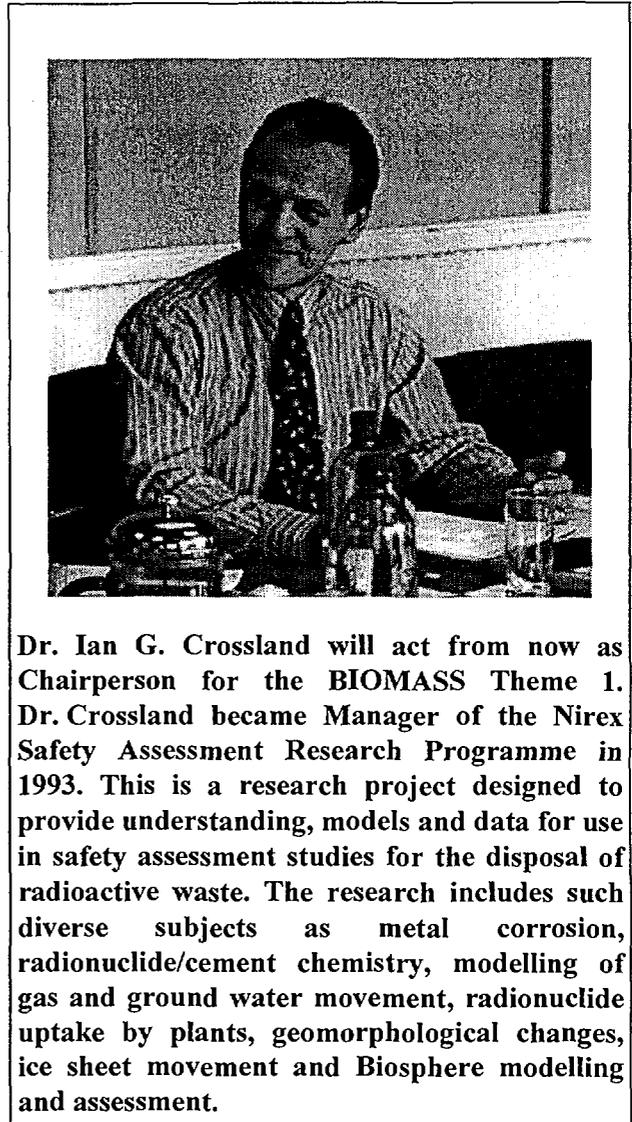
The results for **Example 1, well water abstraction and use for drinking water supply** were discussed at the May meeting. Data assumptions were finalised based on consistent application of the now nearly finalised working material referred to above. It was agreed to extend the list of radionuclides considered. The importance of dilution at the interface between geosphere and biosphere models was highlighted and recognised by first ignoring the potential dilution in aquifers (Example 1A) and then considering the effect of aquifer dilution (Example 1B). A draft WD explaining all the aspects of the Example has already received extensive review from participants. A WD is due to be issued in final form this summer following final review.

Draft material on **Conceptual and Mathematical Development** for Example 2A was discussed. This Example invites more detailed consideration of transport and exposure pathways and the modelling is correspondingly more complicated. This is being developed further, along with the system description, in advance of a technical meeting due to take place in Washington at the end of August, hosted by the US Nuclear Regulatory Commission.

Example 2A only requires consideration of a constant temperate biosphere system, ie no allowance for climate or other substantial changes. It was agreed at the May to develop a further **Fixed Climate** example based on boreal conditions, and also to develop Example 3, to test the methodology for dealing with **Environmental Change**. Further refinement of the assessment context is required in each case and will be developed in advance of the August meeting. According to this plan, the overall output from Theme 1 should then include:

- A simple Example Reference Biosphere (Example 1).
- Examples based on assumed Fixed Climate conditions (Example 2).
- Examples based on a requirement to consider Climate and other Environmental Change (Example 3).

It was recognised that the simple Example is widely applicable and should provide a useful gauge to determine the significance of long term releases to the biosphere. Equally, the more detailed Examples more fully address issues of relevance to demonstration of safety. The inclusion of additional detail could then make the Examples less generically relevant, but the methodological aspects are then of increasing value.



Dr. Ian G. Crossland will act from now as Chairperson for the BIOMASS Theme 1. Dr. Crossland became Manager of the Nirex Safety Assessment Research Programme in 1993. This is a research project designed to provide understanding, models and data for use in safety assessment studies for the disposal of radioactive waste. The research includes such diverse subjects as metal corrosion, radionuclide/cement chemistry, modelling of gas and ground water movement, radionuclide uptake by plants, geomorphological changes, ice sheet movement and Biosphere modelling and assessment.

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

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2. THEME 2: ENVIRONMENTAL RELEASES

For more information please contact the Working Group Leader:



Dose Reconstruction and Remediation Assessment Working Groups in Vienna during their last meeting 31 May–4 June 1999.



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2.1 Dose Reconstruction Working Group.

The Dose Reconstruction Working Group concentrated on the Iput River Scenario, which deals with ^{137}Cs contamination of the catchment basin and agricultural area in the Bryansk Region of Russia, a region that was heavily contaminated by the Chernobyl accident. Modelling endpoints include ^{137}Cs concentrations in food products and animal feed, human whole body concentrations, and average internal and external doses to residents of the region. Initial predictions for all endpoints have been presented and discussed, and predictions for plant products (e.g., cereals, leafy vegetables, potatoes) have been compared to the test data (measurements).

Final model predictions for all endpoints of the Iput River Scenario are requested by 15 September 1999. Documentation of the models (structure, parameter values etc.) is also due at this time. At the October meeting, model predictions for all endpoints will be compared to the test data. Participants will then be asked to complete their evaluations of individual model performance for inclusion in the final report for the Scenario. A draft final report for the Iput River Scenario will be completed by early 2000.

The final report for the Hanford Scenario was distributed to Working Group participants as a working document; this report will be available to all BIOMASS participants at the October meeting.

2.2 Remediation Assessment Working Group.

In the Remediation Working Group the Olen case is considered. The case deals with the remediation of a radium contaminated area of approximately 100 ha. There are two scenarios:

Olen Scenario Type A in which the influence of a past remedial action on the radium contamination of cow's milk during the period 1971–1972 was assessed and compared with post remediation measurements. The working document is almost finalised and will be distributed at the next meeting.

Olen scenario Type B in which the effectiveness of potentially feasible remedial actions has to be assessed and intercomparisons of the modelling results are made. It was agreed that two remedial actions would be considered. The first is the removal of surface soil down to 1 m in the most contaminated areas, the second one is covering the

contaminated area with: (a) a clean soil layer of 0.5 m; and (b) a clean soil layer of 1 m.

Four modellers submitted deterministic results for the Olen Scenario Type B. During the meeting, an intercomparison of these results was made and the modelling approaches were discussed. There was also some discussion about the correct interpretation of the scenario description and about the parameters that need to be considered in the uncertainty analysis. A revised version of the scenario description, with additional information about the uncertainty ranges of the input parameters, will be sent to the participants by 18 June. The deadline for submitting preliminary stochastic modelling results and revised deterministic results together with the model description is 31 August. A first analysis of the stochastic model predictions will take place at the next meeting in October 1999.

If you are interested, please contact either of the Working Group Leaders:



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3. THEME 3: BIOSPHERE PROCESSES

3.1 Tritium Working Group



The Tritium Working Group (TWG) met 24–27 May 1999 at RFNC-VNIIEF, Sarov, Russia. A total of 25 participants from 15 institutions and 9 different countries attended the meeting. Thanks to Dr. Lev Belovodsky and Dr. Aleksey Golubev from RFNC-VIIEF and to our sponsor, the Atomic Energy Commission, Direction of Military Applications, Direction of Quality and Security (CEA/DAM/DQS), France.

Technical discussions were centred around the following five meeting objectives:

- Comparison of results for the two current model-model inter-comparison scenarios and discussion of a draft IAEA Working Document report that summarises the results for the first scenario.
- Discussion of predictions for two model-data scenarios.
- Development of a new model-data scenario and discussion of the possibility of a sixth model-data scenario.
- Discussion of results for the field sampling experiment designed to obtain data on wet and dry deposition of tritium to help modelling approaches for such deposition processes.
- Development of the future work programme, time schedule for the various TWG activities agreed during the meeting and consideration of plans for future meetings.

Model-Model Inter-comparison Scenarios

At the inception of the TWG in 1996, no field data were immediately accessible against which models could be tested. Therefore, two model-model inter-comparison scenarios were developed to allow modellers to discuss modelling approaches to various problems associated with long-term releases of tritium, either to the atmosphere or to subsurface groundwater, whilst preparation of data for suitable model-data test scenarios was undertaken.

Scenario 1. This scenario is concerned with modelling the steady-state behaviour of tritium in the environment when atmospheric releases are assumed to be nearly constant and a steady-state equilibrium has been reached. The scenario has been divided into two parts. The first part (Scenario 1.3) deals with assessing concentrations of tritium in a number of environmental media (air, soil water, plant) as a result of atmospheric deposition. This part of the scenario is now complete, although discussions are still continuing as to the reasons for differences in predictions. The second part (Scenario 1.4) considers the impact of long-term atmospheric releases of tritium on ground waters following percolation

through soil (i.e. an unsaturated medium) and the subsequent vertical and horizontal tritium concentration profiles in the aquifer. Differences in calculated endpoints are due to conceptual model differences (e.g. boundary condition assumptions such as confined versus free surface concepts) or on the mathematical approach to the solution (e.g. analytical or numerical solution methods for 1D, 2D or 3D realisations).

Scenario 2. The scenario considers a postulated perched aquifer with a constant tritium concentration that is situated beneath a non-vegetated soil. The fluctuation of the watertable level is assumed to be negligible. Modellers calculate water and tritium profiles in the soil for specific months of the year and tritium fluxes from the soil surface to atmosphere for a twelve month period. At the Plenary Meeting in October 1998, modified input data had been provided. However, following review of the ten sets of results submitted for the Sarov meeting, there were active discussions as to whether the modified data were appropriate for the specified conditions. As a result, it was agreed that a new approach to calculations, and modified endpoints, would be adopted (see TWG Meeting Notes, June 1999). The importance of various processes will be examined by including or excluding them in the models and then comparing results.

Model-Data Test Scenarios

During the last year, the TWG has been fortunate that colleagues from two different institutions have been able to collate field sampling data as a basis for two model-data test exercises.

Scenario 3 (CRL). This scenario, as the name implies, is based on data collated for long term atmospheric releases of tritium from three different sources at the Chalk River Laboratory site in Canada. The scenario is led by Dr. P. Davis (AECL). This was the second iteration of results and seven sets of calculations had been submitted. Each modeller explained the approach used to address the scenario endpoints, namely predicted concentrations of tritium in rainwater, soil water and vegetation (TFWT and OBT) for specified locations and sampling dates. Since it is considered that no further new calculations will be performed, the actual data were released to participants. Differences among results and compared to the actual data were attributed to factors such as use of different washout coefficients, inclusion or not of dry deposition, the isotopic factor used, and method for calculating OBT concentrations. The results of the model test

exercise will be written up and included in the next draft of the Working Document to be discussed at the October 1999 Plenary Meeting.

Scenario 4 (VNIIEF). This scenario is based on data collated for long term atmospheric releases of tritium from a source on the RFNC site in Sarov. The scenario is led by Dr. L. Belovodsky and Dr. A. Golubev (RFNC-VNIIEF). Modellers have been provided with information on the landscape, climate, meteorological conditions, vegetation, soil properties and atmospheric releases of tritium over a 16 year period (in relative units). So far six modellers have submitted predictions for tritium concentrations at five yearly intervals for air, soil water, plant TFWT, and rain and snow water for three different locations. Since a further three or four modellers intend to carry out calculations, the actual data were not released at this stage. The scenario leaders agreed to provide some supplementary information for the next round of calculations to be discussed in October. The scenario will be closed after the Plenary Meeting and results will be written up for discussion at the Spring 2000 TWG Meeting.

Draft Working Document

A draft Working Document had been circulated to participants prior to the meeting. The text contains information only on Scenario 1 since at the time of preparation it was the only scenario to have been virtually completed. In discussion, it was felt that the text needs to be extended to provide a fuller analysis of differences between calculations for both the atmospheric and groundwater pathways and for the two release types (i.e. HTO or HT). An extended draft text for the scenario will be provided before the next meeting. Additional sections of the report will be added as scenario calculations come to an end and an overall report plan was agreed by participants at the meeting.

New Model-Data Test Scenario

Colleagues at CEA/DASE have collated data from the Valduc site in France which is located near Dijon. A scenario had been prepared and was distributed for discussion at the meeting. It is based on long term releases of tritium to the atmosphere from three sources in a mainly forested area. Information on the tritium releases, meteorological data, soil characteristics and other relevant information have been provided. Modellers will be asked to calculate tritium concentrations for: air; rain water; plant TFWT; and OBT in birch tree growth ring for one specific year and in oak tree leaves at different sampling locations. Following discussion of the draft scenario, it was agreed that some additional

information would be provided and the endpoints for calculation will be clarified. The scenario will then be distributed for calculation so that the first set of results can be discussed at the October Plenary Meeting.

Field Sampling Data to Support Models

Experimentalists from CEA/DASE have been conducting a field sampling programme near an atmospheric release at a site in France. Air and soil samples were collected in various sectors around the source and correlated with the meteorological information. In particular, interest is centred on the influence of wet and dry deposition on media concentrations. Results from the sampling programme were presented and discussed and a number of suggestions were made about how further analyses could be made. Our CEA colleagues will examine the data in more detail and will collaborate in this examination with ZSR, Germany. Results will be presented at the forthcoming Plenary Meeting in October and then the data and a report will be provided to all participants.

Work Programme, Actions, Time Schedule and Future Meetings

A full work programme was agreed and the summary of actions and associated time schedule can be found in the TWG Meeting Notes. With respect to future meetings, Mr. Y. Inoue (IAEA), provided participants with information about an invitation for the TWG to hold a joint meeting next spring with the Kyoto University Reactor Research Institute (KURRI) and the National Institute for Fusion Sciences (NIFS) in Japan 8–12 May 2000. Participants thanked the organising committee in Japan and expressed their interest in attending such a meeting. The proposal will therefore go to the IAEA BIOMASS Co-ordinating Committee meeting for approval during the October Plenary Meeting.

Participants are reminded that the BIOMASS Plenary meeting will be held **4–8 October 1999**. There will be a general plenary session on 6 October and the TWG will meet for two full days on 7 and 8 October. Objectives of the meeting will be to:

- Discuss the second draft of the Working Document report on Scenarios 1.3, 1.4 and 3.0.
- Compare results for Scenarios 2.4, 4.1 and 5.0.
- Examine results of the CEA/DASE and ZSR analysis of the field sampling for wet and dry deposition of tritium around a source in France.
- Plan future work activities and meetings.

Information on any aspect of the work programme, details of scenarios or arrangements for future meetings can be obtained from:



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3.2 Fruits Working Group.



The fourth meeting of the Fruits Working Group was held at the Demokritos Research Centre in Athens (Greece), 10–12 May 1999, hosted by Prof. M. Antonopoulos (second left). Thanks to him and to our sponsor the Ministry of Agriculture, Fisheries and Food from UK.

The following progress was made at the meeting:

Presentation of models

Models used by the participants in the intercomparisons were presented: among them models already designed, such as CIEMAT (B. Robles) and SPADE (N. Mitchell), and new models that are being designed especially for fruits, such as FRUITPATH (I. Linkov) and IPSN (J. M. Quinault). Differences in the assumptions of the various models were commented on. The different approaches used reflect both the needs and requests of the Institutions, the regulations of the countries and the sensibility of the modellers.

Intercomparison results: Spike scenario

Results on model intercomparisons based on a spike scenario were collected during the previous months and presented by the Technical Secretariat (A. Venter). The models and modellers that contributed to the spike study are listed in Table 1.

Table 1: Models and modellers that participated in the Fruits model-model intercomparison study based on a spike release of Cs-137.

Model	Modeller	Country
SPADE	N Mitchell	England
CIEMAT	B Roblez	Spain
SCKCEN	L Sweeck	Belgium
CHECOSYS	T Riesen	Switzerland
RUVFRU	K Eged	Hungary
FRUITPATH	I Linkov	USA
IPSN	J M Quinault	France

Not all the models take direct account of all the processes such as direct fruit deposition, leaf deposition, translocation or soil deposition. Differences of results for short term assessment (first 2 years) primarily derive from differences in the modelling of deposition on leaves and/or fruits and interception fraction and in the assumptions made by modellers regarding the presence or not of leaves at flowering time. Differences for long term assessment are due to different modelling of soil migration and root uptake. Several other parameters affect the results of modelling exercises: the removal of activity from the system through harvest of fruits and pruning, the space between rows of plants in terms of the covering of the area, the endpoint considered as the whole plant instead of only fruit.

A revision of the spike scenario was proposed, to include the area covered by a plant, the time of leaf emergence, the weight of leaves, the month of leaf fall. Model intercomparisons will be run again. New results with modified scenarios will be discussed at the next meeting.

Intercomparison results: Continuous scenario

Results concerning the continuous scenario presented during the last October meeting were reviewed. They were from FRUITPATH, CIEMAT and SPADE, designed to simulate continuous releases, and from CHECOSYS (T. Riesen), which was adapted from spiked to continuous releases. The differences in the assumptions of the various models and the rationale followed in their development were discussed.

A revision of the continuous scenario was proposed. The deposition in Bq/m^2 will be included, considering that not all the models convert Bq/m^3 into Bq/m^2 .

Model validation

Datasets on apples, blackcurrant and strawberries were provided before the meeting by G. Bengtsson, F. Carini, N. Green, and A. Clouvas. Scenarios for model validation prepared by the Technical Secretariat were presented and discussed. Three scenarios on strawberry contamination with ^{134}Cs and ^{85}Sr (based on experimental data collected by F. Carini) were finalized for validation exercises. They refer to an agricultural system with plants grown in pots under an open tunnel. Two scenarios consider wet deposition on the above-ground part of the plant at two phenological stages, anthesis and beginning of ripening, and one considers soil surface contamination at the anthesis stage. Results of model validation with the proposed scenarios will be discussed during the next meeting.

Fruit conceptual model

The matrix containing the processes identified during the last October meeting was completed with preliminary definitions. It will be circulated by the Technical Secretariat along with a file illustrating the scoring of the processes. Comments will be collected and discussed during the next meeting.

Results from experimental work

New or recent experimental results were presented and discussed:

- "Uptake of tritium, ^{14}C and ^{35}S by fruit crops" (C. Collins). Apples, raspberries and strawberries were contaminated by gaseous deposition of $^{14}CO_2$, $CO^{35}S$ and HTO in a wind tunnel. The air concentration, the deposition velocity, the sink intensity of different compartments of the plant were determined.
- "Reduction of radiocontamination of vines by the method of non-lethal defoliation" (G. Arapis). Dry deposition of ^{134}Cs was simulated on vines at the beginning of fruit formation. Some fruits were covered during the contamination and some plants

were partially defoliated with two different agrochemicals. The concentration of ^{134}Cs was determined in fruits at ripening in the first and second year after deposition.

- "Radiocesium distribution in a Greek agricultural and forest ecosystem. Measurements and theoretical calculations" (A. Clouvas).

Data on the contamination of fruits and fruit tree components collected in Greece for several years after the Chernobyl accident allowed the study of processes such as the translocation from tree reservoirs and root uptake in time. Two models were developed, based on experimental findings, on the contamination of perennial plant products and on the distribution of radiocaesium in soil.

Deliverables. The documents that the Fruits Working Group will complete by October 2000, at the end of the BIOMASS Project, were discussed. They will form the final IAEA TECDOC of the Working Group. Some documents that will be too extensive for inclusion in the IAEA TECDOC will be produced entirely as Working Documents of the Group. The review "A critical review of experimental, field and modelling information on the transfer of radionuclides to fruit" has been finalized as a Working Document of the Group and the chapters have been sent, after approval from the BIOMASS Co-ordinating Committee, to the Journal of Environmental Radioactivity for publication.

Next Meeting

The next meeting of the Fruits Working Group will be held in Vienna (see front page) within the framework of the IAEA BIOMASS Annual Plenary Meeting 4–8 October 1999. Purpose of the meeting:

- Discussion of new model intercomparison results.
- Discussion of model validation results and preparation of a new scenario.
- Discussion of matrix results for the Fruit Conceptual Model.
- Discussion of the deliverables:
Model Intercomparisons, Model Validation;
Fruit Conceptual Model, Database;
Experimental Studies, Priorities and recommendations.
- Work programme and future meeting plans

Request for contribution

- Those who wish to contribute to the fruit database can request the proforma and associated helpfile for submitting data from the dedicated database address: radflux@mouchel.com or directly to the Radflux Database Chairman N. Mitchell.
- Persons interested in participating in the

model intercomparison and model validation studies can request detailed scenarios from the Technical Secretariat (QuantiSci) at: "biomass@quantisci.co.uk".

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3.3 Forest Working Group.



The Swedish Radiation Protection Institute is sponsoring our Forest Modelling Working Group activities. They hosted the last Working Group Meeting in Stockholm. We would like to congratulate Mr. Larson and Mr. Avila for a job well done.

The second meeting of the Forest Working Group was hosted by SSI in Stockholm, Sweden, 19–21 April 1999. The highlight of the meeting was the presentation of results from the first model-data intercomparison study. Results from seven forest models were evaluated against an independent data set. Data from the Luginsky district in the Zhitomir region, Ukraine, were provided by Alexander Orlov and Vladimir Krasnov of the Poleskya Agro-forest-ameliorative Scientific Research station. The following modellers participated in the study: George Shaw (United Kingdom), Serguei Fesenko (Russian Federation) and Rodolfo Avila (Sweden), Ronny Bergman (Sweden), Sergey Mamikhin (Russian Federation), Alexei Konoplev (Russian Federation), Igor Linkov (USA), Aino Rantavaara (Finland) and Phillipe Calmon (France). For most modellers this was the first opportunity to test their models against an independent data set.

Modellers were requested to submit results for the following endpoints: trunk wood, needles, bark, soil profile, roe deer, bilberries (*Vaccinium myrtillus*) and various species of mushroom. The modelling results generally compared very well with the data. As in the model-model intercomparison study previously undertaken, the results for mushrooms showed the greatest variability with modelled results up to two orders of magnitude lower than the real data. The most likely reason for the differences appears to be the variability in the types and values of transfer factors which modellers obtained from various sources (including IAEA-TECDOC-364). A major outcome of the model-data intercomparison is the instigation of a review of these transfer factors, their definitions and application to forest modelling. Another major outcome of this exercise is a statistical analysis of the results from both the model-model and the model data intercomparison. In addition, studies will be undertaken to determine the significance of the differences in results.

In the near future the modellers will undertake a second model-model intercomparison study that is based on a forest growing on a site for near surface disposal of radioactive waste. The results are to be presented at the next meeting of the Forest Working Group (Vienna, October 1999). As this will be the first opportunity for most of the modellers to model a continuous sub-surface source it should present a real challenge!

A number of interesting and useful presentations were also delivered at the meeting in Stockholm.

Prof. Goran Ågren of the Swedish University of Agricultural Sciences gave a presentation on growth modelling, highlighting its relevance to

modelling the behaviour of radionuclides in forests.

Yves Thiry (SCK/CEN, Belgium) continued his series of talks on forest processes. He presented an interaction matrix of forest processes that was compiled by the Forest Working Group participants during the last six months. He also defined gaps and needs for potential changes in modelling of forests (including the effect of tree growth modelling).

Alexei Konoplev (Russian Federation) presented an interaction matrix for forest soil processes, as well as his model for forest soils based on this matrix.

The third day of the meeting was spent on a trip to the Swedish low and intermediate level radioactive waste repository (SFR) at Forsmark. Upon arrival at the facility, there was a short presentation on the SAFE Project, as well as the SFR, whereafter the participants were taken on a guided tour of the facility. On the way back to Stockholm, three short stops were made into forest areas to give participants the opportunity to experience Swedish forests and to inspect the variety of flora. Unfortunately, instead of the much hoped-for moose or roe deer, the only fauna encountered were radioecologists!

The Forest Working Group would like to thank SSI for hosting such an excellent meeting and SKB for the very interesting and enjoyable field trip. In addition, Alexander Orlov's donation of data for the model-data intercomparison, as well as his active participation in the meeting itself, was much appreciated. The next meeting of the Forest Working Group will form part of the annual BIOMASS Plenary Meeting in Vienna.

The model-model Intercomparison Study Report has been finalised, and will be issued as IAEA Working Material within the next few weeks. It will be distributed to everybody on the Forest Working Group Mailing List. If you are not on the mailing list, but would like to receive a copy, or if you are not sure whether you are on the mailing list, please contact the Technical Secretariat, Ansie Venter (aventer@quantisci.co.uk).

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4.- EDITORIAL NOTE

IAEA Developments on Environmental Protection and Control of Discharges. An IAEA TECDOC on "Protection of the environment from the effects of ionizing radiation" has been completed and will be published shortly. This TECDOC explores the various issues relevant to and approaches for setting criteria for protecting the environment. Its aim is to stimulate discussion, as the first step towards establishing an internationally agreed philosophy and a methodology for protecting the environment from the effects of ionizing radiations. IAEA work in this area will continue with the long-term objective of providing specific recommendations on environmental protection criteria and associated assessment methods.

An IAEA Safety Guide on "Regulatory control of radioactive discharges into the environment" has been approved for publication. This Safety Guide provides guidance for setting discharge limits. It makes reference to assessment models and data that are described in a companion Safety Report on "Generic models for use in the control of

radioactive discharges into the environment". This Safety Report describes simple screening models for assessing critical group and collective doses arising from routine discharges to the atmosphere or to surface waters. This Report is in the final stages of preparation.

IAEA Developments on Biosphere Assessment and Modelling. Revision of IAEA Technical Reports Series No. 364 "Handbook of parameter values for the prediction of radionuclide transfer in temperate environments". The first Handbook of parameter values for the prediction of radionuclide transfer in temperate environments was published in 1994 based on a review of available data up to the end of 1992. It is comprised largely of tables of values for commonly used empirical transfer parameters used in radiological assessment models. Since the early nineteen nineties, there has been a considerable increase in available information, the IAEA is carrying out a revision of the Handbook.

IAEA Developments on Environment Monitoring. An IAEA Safety Guide on "Source and Environmental Monitoring for Public Protection Purposes" is under development. This Safety Guide will provide guidance on the monitoring of radiation for the protection of the public.

5. BIOMASS DOCUMENTS

BIOMASS Working Documents :

BIOMASS/G/WD01.- BIOMASS, The IAEA Programme on Biosphere Modelling and Assessment Methods: Themes for a new Co-ordinated Research Programme on Environmental Model Testing and Improvement. Theme 1: Radioactive Waste Disposal, Theme 2: Environmental Releases and Theme 3: Biosphere Processes. International Atomic Energy Agency, Vienna, August, 1996. (available)

BIOMASS/T1/WD01.- BIOMASS, The IAEA Programme on Biosphere Modelling and Assessment Methods. BIOMASS THEME 1, Radioactive Waste Disposal. Long Term Releases from Solid Waste Disposal Facilities: The Reference Biosphere Concept. International Atomic Energy Agency, BIOMASS/T1/WD01, Vienna, 1999. (available)

BIOMASS/T1/WD02.- BIOMASS, The IAEA Programme on Biosphere Modelling and Assessment Methods. BIOMASS THEME 1, Radioactive Waste Disposal. Alternative Assessment Contexts: Implications for Development of Reference Biospheres and

Biosphere Modeling. International Atomic Energy Agency, BIOMASS/T1/WD02, Vienna, 1999. (In press, available for next BIOMASS Plenary meeting)

BIOMASS/T1/WD03.- BIOMASS, The IAEA Programme on Biosphere Modelling and Assessment Methods. BIOMASS THEME 1, Radioactive Waste Disposal. Guidance on the Definition of Exposed Groups for Solid Radioactive Waste Disposal. International Atomic Energy Agency, BIOMASS/T1/WD03, Vienna, 1999. (In press, available for next BIOMASS Plenary meeting)

BIOMASS/T1/WD04.- BIOMASS, The IAEA Programme on Biosphere Modelling and Assessment Methods. BIOMASS THEME 1, Radioactive Waste Disposal. Guidance for the Application of Data to Assessment Models. International Atomic Energy Agency, BIOMASS/T1/WD04, Vienna, 1999. (In press, available for next BIOMASS Plenary meeting)

BIOMASS/T1/WD05.- BIOMASS, The IAEA Programme on Biosphere Modelling and Assessment Methods. BIOMASS THEME 1, Radioactive Waste Disposal. Reference Biosphere Examples 1A and 1B: Drinking Water Well. International Atomic Energy Agency, BIOMASS/T1/WD05, Vienna, 1999. (In press, available for next BIOMASS Plenary meeting)

BIOMASS/T2DR/WD01.- BIOMASS, The IAEA Programme on Biosphere Modelling and Assessment Methods. BIOMASS THEME 2, Environmental Releases, Dose Reconstruction Working Group: Model Testing Using Data on Iodine-131 released from Hanford. International Atomic Energy Agency, BIOMASS/T2DR/WD01, Vienna, 1999. (In press, available for next BIOMASS Plenary meeting)

BIOMASS/T2RA/WD01. BIOMASS, The IAEA Programme on Biosphere Modelling and Assessment Methods. BIOMASS THEME 2, Environmental Releases, Remediation Assessment Working Group: Initial Case in Remediation Assessment: Radium Extraction Site, Olen Scenario Type A. International Atomic Energy Agency, BIOMASS/T2RA/WD01, Vienna, 1999. (In press, available for next BIOMASS Plenary meeting)

BIOMASS/T3TM/WD01. BIOMASS, The IAEA Programme on Biosphere Modelling and Assessment Methods. BIOMASS THEME 3, Biosphere Processes, Tritium Modelling Working Group: Modelling of Environmental Transport of Tritium in the Vicinity of Permanent Sources. International Atomic Energy Agency, BIOMASS/T3TM/WD01, Vienna, 1999. (In press,

available for next BIOMASS Plenary meeting)

BIOMASS/T3FM/WD01.- BIOMASS, The IAEA Programme on Biosphere Modelling and Assessment Methods. BIOMASS THEME 3, Biosphere Processes, Fruits Modelling Working Group: The Transfer of Radionuclides to Fruit: An Overview. International Atomic Energy Agency, BIOMASS/T3FM/WD01, Vienna, 1999. (In press, available for next BIOMASS Plenary meeting)

BIOMASS/T3FTM/WD01.- BIOMASS, The IAEA Programme on Biosphere Modelling and Assessment Methods. BIOMASS THEME 3, Biospheric Processes, Forest Modelling Working Group: Model-Model Intercomparison Study. International Atomic Energy Agency, BIOMASS/T3FTM/WD01, Vienna, 1999. (In press, available for next BIOMASS Plenary meeting)

BIOMASS Papers:

BIOMASS/Paper/01.- K. M. Thiessen, M. C. Thorne, P. R. Maul, G. Prohl, H. S. Wheeler. Modelling Radionuclide Distribution and Transport in the Environment. Environmental Pollution, Elsevier Science Ltd, 1999. (In press). *Principal author e-mail: kmt@senes.com*

This subsection will include references to papers related to Biosphere Modelling and Assessment presented by BIOMASS participants at International Symposiums, Congresses or Publications. If you wish that a reference for your paper appears in this section, please send a copy of it to C. Torres (address in page 13) indicating that it is for inclusion into BIOMASS newsletters. Do not forget to provide us with the e-mail of the principal author, as it will also be included in the reference.

The subsection will also include official BIOMASS papers prepared by the IAEA or on its behalf.

BIOMASS Newsletters:

BIOMASS/NL01.- BIOMASS Newsletter No 1. The International Atomic Energy Agency Programme on Biosphere Modelling and Assessment. BIOMASS news, June 1996.

BIOMASS/NL02.- BIOMASS Newsletter No 2. The International Atomic Energy Agency Programme on Biosphere Modelling and Assessment. BIOMASS news, December 1996.

BIOMASS/NL03.- BIOMASS Newsletter No 3. The International Atomic Energy Agency Programme on Biosphere Modelling and Assessment. BIOMASS news, July 1997.

BIOMASS/NL04.- BIOMASS Newsletter No 4.

The International Atomic Energy Agency Programme on Biosphere Modelling and Assessment. BIOMASS news, January 1998.

BIOMASS/NL05.- BIOMASS Newsletter No 5.

The International Atomic Energy Agency Programme on Biosphere Modelling and Assessment. BIOMASS news, July 1998.

BIOMASS/NL06.- BIOMASS Newsletter No 6.

The International Atomic Energy Agency Programme on Biosphere Modelling and Assessment. BIOMASS news, January 1999.

If you would like more information about the BIOMASS programme please contact:



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REGISTRATION FORM FOR THE FOURTH BIOMASS PLENARY MEETING
IAEA HEADQUARTERS, VIENNA, 4-8 OCTOBER 1999
IAEA CO-ORDINATED RESEARCH PROGRAMME ON BIOSPHERE MODELLING
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