UNITED STATES
NUCLEAR REGULATORY COMMISSION
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November 27, 1996

MEMORANDUM TO: John H. Austin, Chief
Performance Assessment
and HLW Integration Branch
Division of Waste Management/NMSS

THRU: Keith I. McConnell, Section Leader RC, for KIM
Performance Assessment
and HLW Integration Branch
Division of Waste Management, NMSS

FROM: Christepher A. McKenney
Performance Assessment
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Division of Waste Management, NMSS

SUBJECT: FOREIGN TRAVEL TRIP REPORT FOR BIOMOVS II/BIOMASS MEETING

Attached is a trip report of the final meeting of the Biospheric Model Validation Study (BIOMOVS II) and the initial meeting of the new International Atomic Energy Agency (IAEA) program on Biosphere Modelling and Assessment Methods (BIOMASS) in Vienna, Austria, on October 7-11, 1996. Our organization is not a primary participant in these IAEA ventures, but is a very interested observer, especially with regards to guidance on reference biosphere and critical group methodologies.

BIOMOVS II was a six-year effort modelling migration and accumulation of trace contaminants through the biosphere. NRC has been an interested observer in mainly the working group on the reference biosphere methodology.

BIOMASS is a new six-year effort that will be focused on three main areas: radioactive waste disposal, environmental releases, and biospheric processes. The radioactive waste disposal theme (Theme 1) is directed at implementing the Reference Biosphere Methodology developed in BIOMOVS II and may provide insights to our use of the concepts. One of the specific issues to be pursued in the first year is development of guidance on defining critical groups for long-term analysis. The second theme, titled environmental releases, is a program of computer modelling benchmarking and validation studies for either dose reconstruction activities or remediation activities. The third theme on biospheric processes is not well-defined at this time and was accepting proposals on activities during the initial meeting. Areas that may be covered include lysimeter studies, uranium mill tailings, tritium, and forest/fruit tree modeling.

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Based on the time frame scoped for BIOMASS, applicability and ease of use within our appropriate waste management programs is not completely certain. The applicability of insights provided by the BIOMASS Theme 1 depends not only on the actual issues but also the extent of the rulemaking to implement the future U.S. Environmental Protection Agency's site-specific standard for Yucca Mountain. Based on the timetable set for Theme 1, the recommendation would be to remain an observer through the development of the guidance on defining critical groups, and then, re-evaluate our participation in Theme 1. For Theme 2, the recommendation would be to request the Office of Research to become involved in the benchmarking and validation studies with the decommissioning evaluation code, D&D SCREEN, that is under development. Currently, the recommendation would be for no participation in Theme 3 activities.

Attachment: As stated

Contact: C. McKenney, DWM/PAHL
415-6663

BIOMOVS II/BIOMASS MEETING REPORT

On October 7-11, 1996, the International Atomic Energy Agency (IAEA) hosted the final meeting of the Biospheric Model Validation Study (BIOMOVS II) and the initial meeting of Biosphere Modelling and Assessment Methods (BIOMASS) in Vienna, Austria. BIOMOVS II was a six-year effort modelling migration and accumulation of trace contaminants through the biosphere. NRC has been an interested observer in mainly the working group on the reference biosphere methodology. BIOMASS is a new six-year effort that will be focused on three main areas: radioactive waste disposal, environmental releases, and biospheric processes.

BIOMOVS II

The first three days of the meeting were devoted to finishing the work on the BIOMOVS II documents and, specifically, Technical Report No. 16, the BIOMOVS II Overview document. A summary of the BIOMOVS II Working Groups and BIOMASS Themes is attached. The two areas of most interest to DWM have been the related working groups on reference biosphere and complementary studies. Of other interest is some of the results from the Uncertainties and Validation (U&V) working group and the Uranium Mill Tailings (UMT) working group.

DWM has been an active observer in the Reference Biosphere and Complementary Studies working groups. We have attended both the annual meeting and some of the working group meetings. At the working group meeting in April 1996,
Tim McCartin, DWM/PAHL, presented information on some of the staff's initial reaction to the National Academy of Science's (NAS) recommendations for a site-specific Yucca Mountain standard. Based on NAS recommendations to employ an individual constraint limit, use of a reference biosphere and critical group approach will be necessary to calculate the long-term impacts from the disposal site. The main product of the Reference Biosphere working group has been the Reference Biosphere Methodology. The Reference Biosphere Methodology is an approach to select the appropriate biosphere for use and document the decisions made to select the biosphere. The major emphasis of the first theme of BIOMASS is the implementation and augmentation of the Reference Biosphere Methodology.

Information from the U&V and the UMT working groups may be of use, either directly or indirectly, to DWM. In U&V, one of the major findings was that there was generally a factor of ten difference between results from various models, either due to model differences, or user interpretation of models and data. Two computer codes used in the decommissioning area, MEPAS and RESRAD, participated in the UMT study. This study has published the entire database of data used in the study to allow other codes to perform benchmarking evaluations with the participating codes. It would be of benefit to benchmark the code being developed by the Office of Research, D&D Screen, to MEPAS and RESRAD, to evaluate the differences between code results. Therefore, it would be

Attachment

useful to have the developer either analyze the UMT data set, or participate in the BIOMASS Theme 2 group on environmental remediation modelling, as discussed below.

BIOMASS

BIOMASS is a new six-year IAEA program that is subdivided into three different topical areas, termed themes. A list of the three themes is on the attached BIOMOVS II summary sheet. Two of the themes, Radioactive Waste Disposal and Environmental Releases, had been well-developed prior to the meeting. The third theme was accepting proposals for activities related to biospheric processes. Most of the two days were spent in subgroups focused on a specific theme. I attended the Radioactive Waste Disposal (Theme 1) discussion and most the time was spent with the chairpersons introducing the topics.

Theme 1 is focused on implementing and improving the Reference Biosphere Methodology developed in BIOMOVS II. The theme is divided into three general areas (as related to the Reference Biosphere Methodology): Completion, Implementation, and Augmentation. The currently planned activities are further divided into six task groups, all of which are in the first two general areas:

1) Principles for the Definition of Hypothetical Critical Groups,
2) Principles for the Application of Data to Assessment Models,
3) Consideration of Alternative Assessment Contexts,
4) Biosphere System Identification and Justification,
5) Biosphere System Descriptions, and
6) Model Developments.

In the Theme 1 task schedule (attached), possible topics for development in the augmentation area are listed. The first four task groups are planned to be completed in approximately 18 months or less.

Task Group 1 (Critical Group definition) is chaired by John Kessler of EPRI. The purpose of this task group is to provide guiding principles for defining hypothetical critical groups for long-term exposure calculations. This task group is to be completed in the first 18 months to allow for implementation of the principles in the biosphere system descriptions and model developments phases of Theme 1. Preliminary discussions at the meeting focused on providing specific detailed guidance that must advance significantly beyond the current guidance of "cautious, but reasonable." Areas to be discussed include effects of assessment context, time periods, regulatory approach (cautious versus equitable), and number of hypothetical groups to include and which subsets (e.g., age-specific, behavior-specific, or enhanced susceptibilities) require inclusion.

Task Group 2 (Data Application) is chaired by Pascal Santucci, IPSN-CEA, France. The purpose of this task group is to define principles on selecting and using data in assessment models. The derivation of assessment-specific parameters from a wider data base of basic biosphere information is a general problem in environmental modelling, and is especially important in analysis of long-term biosphere assessments. Considerations will include the definition, derivation, and justification of 'effective' parameters, based on temporal and spatial scales of assessment model, guidance on data sources, and guidance on developing uncertainty estimates. This task group is scheduled to produce a report in the first 18 months.

Task Group 3 (Assessment Context) is chaired by Morimasa Naito of Power Reactor and Nuclear Fuel Development Corporation, Japan. The purpose of this task group is to investigate the range of possibilities for assessment context, and to determine how particular assumptions may affect the development of biosphere models. The assessment context answers the questions: 1) what are you trying to assess; and 2) why are you trying to assess it? This task group is expected to be finished in the first year.

Task Group 4 (Biosphere Identification and Justification) is chaired by Marianne Menut, ANDRA, France. The purpose of the task group is to define a practical methodology to identify and to justify biosphere systems. Two major areas of discussion are identified: 1) identification and the justification of an approach to account for biosphere evolution; and 2) identify and justify a particular set of representative biosphere systems. Most of the work is to be completed in the first 18 months of the program and will be part of the basis for work in task groups 5 and 6.

Task Groups 5 and 6 are future endeavors for BIOMASS Theme 1. They are focused on implementing the Reference Biosphere Methodology (including information derived from completion activities in Task Groups 1-4). Work is to begin in Task Group 5 (Biosphere System Descriptions) in October 1997 and in Task Group 6 (Model Developments) in October 1998. Additionally, in October 1998, task groups may be defined to work on augmentation of the Reference Biosphere Methodology in topical areas, such as, climate transitions, natural analogs, dynamic modeling techniques, and effects of future human actions.

Model validation and verification efforts are being accomplished in Theme 2. The objective of Theme 2 is "...to provide an international forum to increase the credibility of and confidence in methods and models for assessment of radiation exposure in the context of dose reconstruction and remediation activities." (BIOMASS description document, IAEA, August 30, 1996). Currently, two working groups are underway: 1) Dose Reconstruction and 2) Remediation Activities. Information was available for the initial cases to investigated. Additional cases may be pursued during the course of BIOMASS.

The Dose Reconstruction working group will initially focus on modelling the acute release of ^{131}I from the Hanford PUREX Chemical Separations Plant on September 2-5, 1963. The exercise will use monitoring data from nine surrounding counties to perform model testing and will allow other endpoint calculations for model comparison. The Hanford release is the only exercise currently planned for this working group but evaluation of other possible scenarios will be done near the conclusion of this exercise.

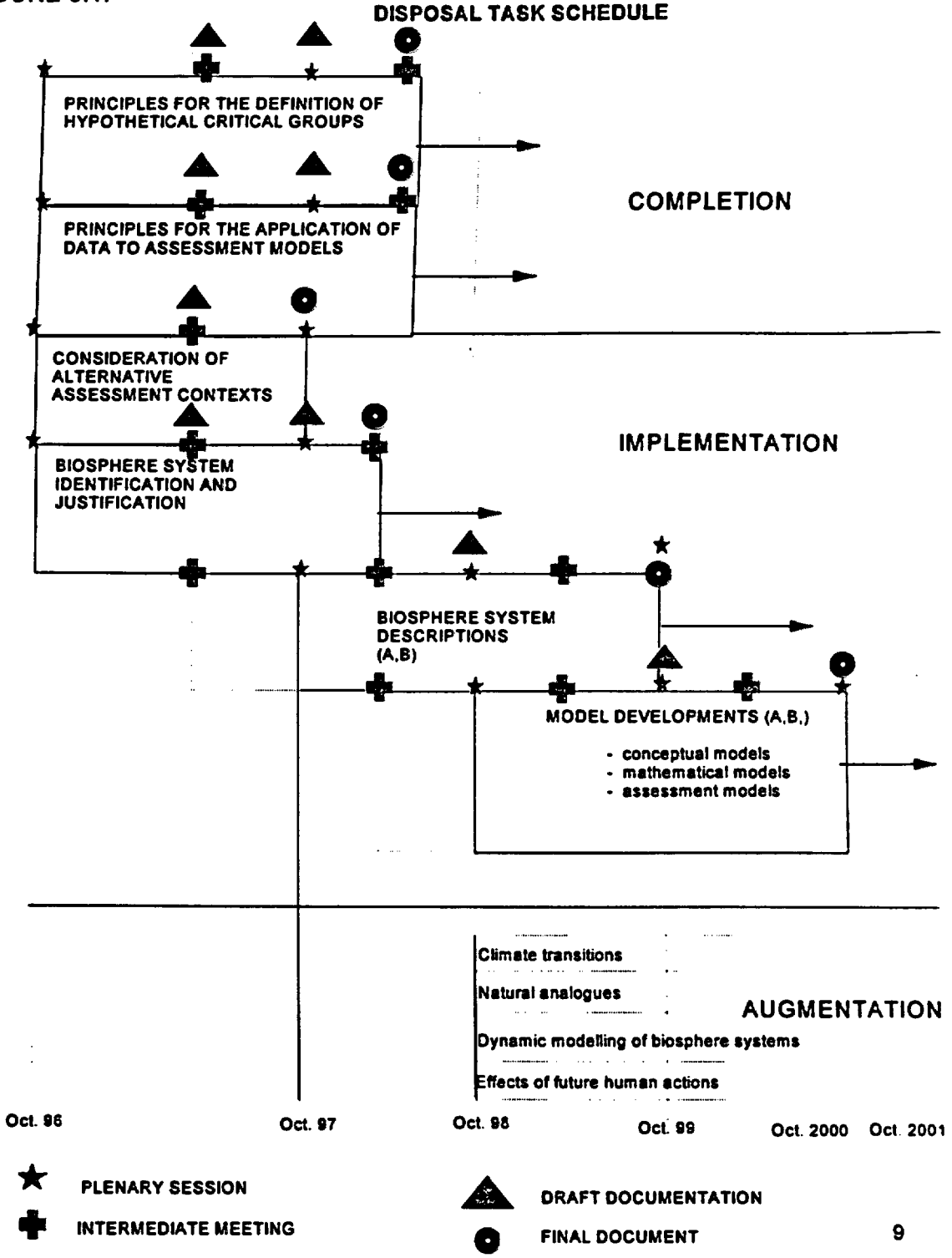
The Remediation Activities working group will have for an initial case, the Olen Radium Extraction Site, Belgium. This exercise will consist of two stages: one for model testing and the other for model comparison. The model testing scenario is focused on the effects of the remediation activities performed at the site in the early 1970s and the ability of current models to accurately predict the results. The model comparison scenario is similar to activities currently done in decommissioning. Participants will model future exposures to a critical group of cultivators using the contaminated soils (based on current contamination levels) and the possible effects of various remediation techniques. A preliminary working plan for the Olen Case is attached.

During the final day of the meeting, work group proposals were discussed for Theme 3, Biospheric Processes. Three working groups were established: Tritium, UMT, Forest Modelling, Fruit Trees, and Lysimeter Studies. The Tritium working group will continue development and confidence in tritium models and will focus on long-term "continuous" releases (as compared to the acute releases in BIOMOVS II). UMT working group will also be an extension of work completed in BIOMOVS II, with the BIOMASS working group investigate aquatic pathways and receptors other than man. The Forest Modelling working group will work on development of a long-term forest model, which would be of great benefit to remediation efforts in countries such as Belarus. The Fruit Tree working group would be developing short-term and long-term models on contamination of fruit trees. Work would be coordinated between the Forest Modelling working group and Fruit Tree working group. The Lysimeter Studies working group would continue work began in BIOMOVS II Lysimeter Studies working group. Schedules for the working groups were not discussed in this meeting.

RECOMMENDATIONS:

Based on the time frame scoped for BIOMASS, applicability and ease of use within our appropriate waste management programs is not completely certain. The applicability of insights provided by the BIOMASS Theme 1 depends not only on the actual issues but also the extent of the rulemaking to implement the future U.S. Environmental Protection Agency's site-specific standard for Yucca Mountain. Based on the timetable set for Theme 1, the recommendation would be to remain an observer through the development of the guidance on defining critical groups, and then, re-evaluate our participation in Theme 1. For Theme 2, the recommendation would be to request the Office of Research to become involved in the Remediation Activities working group, participating in the benchmarking and validation studies with the decommissioning evaluation code, D&D SCREEN, that is under development. Currently, the recommendation would be for no direct participation in Theme 3 activities.

FIGURE 3.1: THEME 1: RADIOACTIVE WASTE DISPOSAL TASK SCHEDULE



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ATTACHMENT 1-1

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PRELIMINARY WORKING PLAN
REMEDIATION ASSESSMENT W.G. (Olen Case)

	Respons.	Oct.'96	Mid'97	Oct'97	Mid'98	Oct'98	Mid'99	Oct'99	Mid'00	Oct'00
Case Presentation Olen site	WGL	X								
Proposal Scenario Type A	WGL	X								
Finalization Scenario Type A	WGL	———	X							
Sending in Results Scenario Type A	Part.		———	X						
Analysis Results Scenario Type A	WGL		———	X						
Proposals Scenarios type B (+ Remedial Options) + Justification	Part.		———	X						
Document on Proposals Scenarios Type B + Justification	WGL			———	X (1)					
Draft Report Scenario Type A	WGL		———	———	X					
Final Report Scenario Type A	WGL				———	X				
Description selected Scenarios Type B	WGL				———	X				
Sending in results Scenarios Type B	Part.					———	——— (2)	X		
Analysis results Scenarios Type B	WGL					———	——— (2)	X		
Draft report Scenarios Type B	WGL						———	———	X	
Overview Analysis + Final Report Olen Case	WGL						———	———	———	X

(1) + Choice of Scenarios
(2) Intermediate Results

Based on the time frame scoped for BIOMASS, applicability and ease of use within our appropriate waste management programs is not completely certain. The applicability of insights provided by the BIOMASS Theme 1 depends not only on the actual issues but also the extent of the rulemaking to implement the future U.S. Environmental Protection Agency's site-specific standard for Yucca Mountain. Based on the timetable set for Theme 1, the recommendation would be to remain an observer through the development of the guidance on defining critical groups, and then, re-evaluate our participation in Theme 1. For Theme 2, the recommendation would be to request the Office of Research to become involved in the benchmarking and validation studies with the decommissioning evaluation code, D&D SCREEN, that is under development. Currently, the recommendation would be for no participation in Theme 3 activities.

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Contact: C. McKenney, DWM/PAHL
415-6663

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