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MEMORANDUM TO: Michael Bell, Acting Chief
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THRU: Keith I. McConnell, Section Leader
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SUBJECT: TRIP REPORT FOR BIOMASS THEME 1 CONSULTANT MEETING, JANUARY 12-16, 1998

On January 12-16, 1998, the International Atomic Energy Agency (IAEA) held a consultant's meeting for Theme 1 of its Biosphere Modeling and Assessment Methods (BIOMASS) program in Vienna, Austria. BIOMASS is a six-year effort that focuses on three main areas or "themes": 1) radioactive waste disposal, 2) environmental releases, and 3) biospheric processes. BIOMASS had its initial meeting in October 1996, in Vienna, Austria.

The Nuclear Regulatory Commission has been previously involved in BIOMASS Theme 1 and its predecessor, Biosphere Modeling and Validation Studies (BIOMOVS II). Theme 1 of BIOMASS is focused on implementing and improving the Reference Biosphere Methodology developed in BIOMOVS II. The use of the reference biosphere and critical group concept is a central issue in implementing a dose- or risk-based standard for high-level waste disposal. Both the legislation currently under consideration by Congress and the recommendations by the National Academy of Sciences support the use of the concept to calculate the radiological impacts from the facility. Therefore, NRC's main focus in BIOMASS is the continuing development of guidance on the implementation of the reference biosphere and critical group concepts. Gaining international consensus on practical approaches is very important in the near term.

I was requested to represent NRC at the meeting because of my previous work at the June 1997 consultants' meeting on Assessment Contexts and continued interactions during the main Theme 1 meetings. This consultants' meeting was attended by Carlos Torres, IAEA; Seppo

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Vuori, VTT Energy, Finland; Michael Egan, AEA Technology, U.K.; Graham Smith, QuantSci, U.K.; and Paloma Pinedo, CIEMAT, Spain. The purpose of the meeting was three-fold: (1) to finalize the Reference Biosphere Concept Report, (2) to allow planning and coordination of activities in Task Groups 5 and 6, and (3) to expand and develop a more detailed description of the first example to be implemented with the Reference Biosphere Methodology.

Michael Egan, Graham Smith and Paloma Pinedo focused on the first two activities while Seppo Vuori and myself focused on the third. During the week, we had multiple interactions between the groups for comments and insights. Seppo Vuori and myself developed both a draft standardized format and content guide for the final BIOMASS reports on implementing the Reference Biosphere Methodology examples and began expanding the first example set by including the background, purpose, general methodology, detailed assessment context, and examples of text for other sections of the final report that will be written after the work is done.

The first example set minimizes the biosphere processes considered. The first example is the basic well water being used for drinking water scenario. One of the main purposes of this example is to help lay the foundation of how the implementation of the examples will be accomplished in and between the various task groups, which are focused on specific informational areas (i.e., receptor groups, biosphere identification, data, etc.). To allow some investigation on the differences in modeling approaches, the drinking water scenario has been subdivided into two separate assessment contexts based on different assumed geosphere/ biosphere interfaces.

The first subexample is similar to the common U.S. approach, including the Total Performance Analysis code, where the geosphere modelers are responsible for modeling the transport of radionuclides through all of the aquifers and transferring either a flux or time-dependent concentration of radionuclides at the well to the biosphere modelers (i.e., the geosphere/ biosphere interface). The biosphere modeling, then, is limited to calculating the dilution due to pumping, and the pathway dose conversion factors are based on an assumed drinking rate for the average member of the critical group.

The second subexample is one common to a few countries, such as Canada, where the near-surface aquifer, from where the critical group abstracts its water, is treated as part of the biosphere. Therefore, the geosphere/biosphere interface is established between the deeper aquifers and the near-surface aquifer, and the geosphere modelers are responsible for providing the flux of radionuclides between the deeper aquifers and the near-surface aquifer. Therefore, the biosphere modelers must calculate transport and dilution in the near-surface aquifer prior to being abstracted from the well. Processes modeled by the biosphere modelers related to the well are the same as the first subexample.

Obviously, the second subexample is more complicated, from a biosphere modeler's point of view. For later examples, this difference could be more important. While in this example, there is little interaction between the biosphere and the near-surface aquifer, later examples will include irrigation, larger well abstraction rates (that may be seasonal), and the possibility to consider recharge or migration of radionuclides out of the soil and back into the groundwater. While it is my opinion that recharge and migration will have minimal effects, it would be helpful

to have BIOMASS exercise the Reference Biosphere Methodology and show that these are minimal effects and are not necessary in every biosphere model.

At the end of the meetings, Carlos Torres suggested that a small core group of individuals such as Seppo Vouri, Graham Smith, Mike Egan, and myself be formed to document the examples following the format and content guide Seppo and I created. Future meetings for document writing would be IAEA-funded consultant meetings, so additional travel expenses by NRC would not be necessary.

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