The IAEA's Programme on Environmental Modelling for RAdiation Safety (EMRAS II)

EMRAS II
Reference Approaches for Human Dose Assessment
Working Group 3
Reference Models for "Waste Disposal"

M I N U T E S

of the Second WG3 Meeting held at IAEA Headquarters, Vienna
25–29 January 2010
(during the Second EMRAS II Technical Meeting)

IAEA Scientific Secretary	Working Group Leader
Mr Gerhard Proehl ***(GP)*** Head, Assessment & Management of Environmental Releases Unit Waste & Environmental Safety Section (Room B0765) Division of Radiation, Transport & Waste Safety International Atomic Energy Agency (IAEA) Vienna International Centre PO Box 100 1400 VIENNA AUSTRIA Tel: +43 (1) 2600-22854 Fax: +43 (1) 26007-22692 Email: G.Proehl(x)iaea.org	Mr Tobias Lindborg ***(TL)*** Biosphere Safety Assessment Manager, Safety & Analysis Swedish Nuclear Fuel & Waste Management Company (SKB) Blekholmstorget 30 Box 250 10 124 STOCKHOLM SWEDEN Tel: +46 70 222 0712 Fax: +46 (8) 661-5719 Email: tobias.lindborg(x)skb.se

Attending	
Name / Initials* / Email	**Organization / Country**
Mr Rodolfo Avila Moreno ***(RAM)*** (rodolfo.avila(x)facilia.se)	Facilia AB, SWEDEN
Mr Sten Berglund ***(SB)*** (sten.berglund(x)skb.se)	Swedish Nuclear Fuel & Waste Management Company (SKB), SWEDEN
Mr Paul Degnan ***(PD)*** (P.Degnan(x)iaea.org)	International Atomic Energy Agency (IAEA), AUSTRIA
Mr Jürgen Gerler ***(JG)*** (jgerler(x)bfs.de)	Bundesamt für Strahlenschutz (BfS), GERMANY
Mr Kai Mikael Hämäläinen ***(KMH)*** (kai.hamalainen(x)stuk.fi)	Radiation & Nuclear Safety Authority (STUK), FINLAND
Mr Ari T.K. Ikonen ***(ATKI)*** (ari.ikonen(x)posiva.fi)	Posiva Oy, FINLAND
Mr Haiyong Jung ***(HJ)*** (hyjung(x)kins.re.kr)	Korea Institute of Nuclear Safety (KINS), REPUBLIC OF KOREA
Mr Jan Christian Kaiser ***(JCK)*** (christian.kaiser(x)helmholtz-muenchen.de)	Helmholtz-Zentrum München GmbH, German Research Center for Environmental Health, GERMANY
Mr Ulrik Kautsky ***(UK)*** (ulrik.kautsky(x)skb.se)	Swedish Nuclear Fuel & Waste Management Company (SKB), SWEDEN
Ms Katerina Kouts ***(KK)*** (kate.kouts(x)mail.ru / Kouts.kate(x)gmail.com)	Republican Scientific Practical Centre of Hygiene (RSPCH), BELARUS
Ms Maria Nordén ***(MN)*** (maria.norden(x)ssm.se)	Swedish Radiation Safety Authority (SSM), SWEDEN

* Initials used to refer to participants within minutes and actions as appropriate.
(x) is used instead of @ in email addresses to block webcrawlers.

Attending	
Name / Initials* / Email	**Organization / Country**
Mr Geert Olyslaegers ***(GO)*** (golyslae(x)sckcen.be)	Studiezentrum für Kernenergie (SCK/CEN), BELGIUM
Mr Danyl Pérez-Sánchez ***(DPS)*** (d.perez(x)ciemat.es)	CIEMAT, SPAIN
Ms Natalia Semioshkina ***(NS)*** (semi(x)helmholtz-muenchen.de)	German Research Center for Environmental Health, GERMANY
Mr Graham Smith ***(GS)*** (gmsabingdon(x)btinternet.com)	GMS Abingdon Limited, UNITED KINGDOM
Mr Shulan Xu ***(SX)*** (shulan.xu(x)ssm.se)	Swedish Radiation Safety Authority (SSM), SWEDEN

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Background and Objectives of the Meeting

EMRAS II Working Group 3 "Reference Models for Waste Disposal" (WG3) met for the first time on 20 January 2009 during the First EMRAS II Technical Meeting (held at IAEA Headquarters in Vienna, 19–23 January 2009), under the WG Leadership of ***GP***, then of the Helmholtz Zentrum (Germany). Since ***GP***'s move to the IAEA (August 2009) ***TL*** has since taken up the role of Working Group Leader. WG3 did not meet again during 2009 due to these reorganizational matters. However, a Draft Work Plan to achieve WG3's objectives was developed and distributed for comment, and some illustrative model results were provided by the Studiezentrum für Kernenergie (SCK/CEN), Belgium. The objectives of this meeting were distributed in advance and were as follows:

— Dissemination of on-going developments made through the IAEA with regard to safety requirements and guides relevant to radioactive waste disposal, notably the Draft Safety Guide on "The Safety Case and Safety Assessment for Radioactive Waste Disposal", DS355;
— Exchange of information: update on biosphere aspects of radioactive waste repository performance assessments (PAs), and identification of critical issues identified in most recent research and assessments; and
— Review, improvement and then approval of version 1.1 of the Work Plan distributed by ***TL*** in October 2009. It is hoped to reach decisions regarding how to implement the Steps in the Work Plan, who will participate in them, and to agree a work schedule.

The key items in the agenda were:

— Briefings from each participant on their interest in WG3;
— Feedback and explanation of the proposed Work Plan;
— Presentations by participants, followed by discussion;
— Work Plan development; and
— Summary and conclusions for Plenary Session presentation.

Briefings from each participant on there interest in WG3

Participants introduced themselves and described their interests, which was particularly important given the additional participation.

GP noted that a series of DS documents relevant to solid radioactive waste management are currently at the final stages of development at the IAEA and should be published during 2010.

Feedback and explanation of the proposed Work Plan

TL presented the latest ideas on the Work Plan which took account of feedback received on version 1.1 thereof. The objectives remain largely the same and are to:

— Agree on approaches for developing reference biosphere models appropriate for assessments of exposures to humans in performance assessment studies of repositories for disposal of solid radioactive waste;
— Allow that the approaches should take into account changes of the exposure conditions as e.g., due to changes of climate, the use of land, agricultural practices and changes in living habits; and
— Derive a set of models which cover a wide range of environmental situations.

The steps in the Work Plan were presented and are provided here as Annex A.

Presentations by participants, followed by discussion

The following presentations were given:

Presentation Title	Presenter
Implications for reference biosphere approaches arising from models and calculations in ♣BIOMOSA project, and additional ♣calculation results	***GO*** (SCK/CEN, Belgium)
Biosphere modelling approach in ♣Germany	***JCK*** (H-Z, Germany)
Outputs from the ♣BIOCLIM and BIOPROTA projects and their application	***GS*** (GMS Abingdon Ltd, UK)
The need for process understanding in the derivation of a ♣credible dose model for geological repositories	***SX*** (SSM, Sweden)
♣Radionuclide transport in surface systems: Examples of supporting modelling	***SB*** (SKB, Sweden)
SKB's approach to ♣human behaviour assumptions	***UK*** (SKB, Sweden)
POSIVA approach to the biosphere – what does this mean for characterisation♠	***ATKI*** (Posiva Oy, Finland)
Biosphere models applied in the safety assessment of a ♣deep geological disposal	***RAM*** (Facilia AB, Sweden)

♣ Indicates the name of the presentation given on the WG3 web page (http://www-ns.iaea.org/projects/emras/emras2/working-groups/working-group-three.htm)
♠ This presentation is unavailable due to copyright issues.

Extensive discussions followed after each presentation. It was noted that some organizations have interest in solid waste repository projects which are currently in the early stages of development, or are still not site specific, whereas other organizations are interested in the assessment of specific sites. This has significant implications for the most appropriate biosphere modelling approach. For the purposes of discussion and analysis, three stages in repository development were recognized as being pertinent to the type of reference biosphere models which might be used in repository performance assessment, i.e., proof of concept, site selection, licensing and construction/operation. (Assessment for repository closure is also required and this may gain from ongoing monitoring of the site, but this aspect was not thought significant for the current objectives.)

Work Plan development

It was agreed to work in four subgroups (SG) as follows:

— ***SG1 Analogue Approach (NS, KK, JCK and JG)***

SG1 will focus on the use of data for present day conditions at other sites with different climate and other characteristics which are considered as suitable analogues for future conditions at the site in question.

— ***SG2 Soil-Plant Processes (GO, DPS and SX)***

SG2 will focus of the important features of the soil plant system. This was considered important because of the role of the foodchain in the most significant exposures for the most significant

radionuclides, such as Cl-36 and I-129, as determined from previous assessments. Of special interest is how environmental change affects processes and parameters.

— ***SG3 Dynamic analysis of future biosphere systems at specific sites (ATKI, SB, UK, RAM and TL)***

SG3 will explore the use of system modelling of climate and landscape change to understand the possible future biosphere conditions at a site, on a site specific basis.

— ***SG4 Demonstrating compliance with protection objectives (MN, KMH and HJ)***

SG4 will explore the implications for demonstrating compliance at different stages of repository development taking into account environmental change.

Each of the four SG's have developed their own strategy to meet the objectives and time frame for producing outputs for presentation and discussion during the next WG3 meeting, planned to be held in October 2010 (see below). The SG activities during 2010 will be described in the WG3 Work Plan version 2.

Summary and conclusions for Plenary Session presentation

— The WG3 meeting had achieved its objectives.

— The work programme is based on implementation through four SGs.

It was noted that not all organizations or individuals who had participated in the first WG3 meeting (held in 2009) had been able to attend this current meeting, i.e.:

Name / Email	**Organization / Country**
Mr Philippe Calmon (philippe.calmon(x)irsn.fr)	Institut de Radioprotection et de Sûreté Nucléaire (IRSN), FRANCE
Mr Václav Hanusík (hanusik(x)vuje.sk)	VÚJE Inc. - Engineering, Design & Research Organization, SLOVAK REPUBLIC
Mr Gerald Kirchner (gkirchner(x)bfs.de)	Bundesamt für Strahlenschutz (BfS), GERMANY
Ms Laura M.C. Limer (LauraLimer(x)quintessa.org)	Quintessa Limited, UNITED KINGDOM
Ms Laura Marang (laura.marang(x)edf.fr)	Electricité de France (EDF) - Département Environement (R&D), FRANCE
Mr Yves Thiry (Yves.Thiry(x)andra.fr)	ANDRA, Agence Nationale pour la Gestion des Déchets Radioactifs, FRANCE
Mr Alan Henry Tkaczyk (alan(x)ut.ee)	University of Tartu, ESTONIA

It was agreed to encourage their continued support with regard to implementation of the Work Plan. In addition, also noted that wider participation could be encouraged, for example from NWMO, NDA/RWMD, NUMO, NAGRA, EPRI, CSN, EA and others. ***TL*** agreed to coordinate further inputs with the WG3 SGs.

WG3 plans to provide a draft document to the IAEA with recommendations addressing WG3 objectives during the next (Third) EMRAS II Technical Meeting, being held at IAEA Headquarters in Vienna, 24–28 January 2011.

Next WG3 Meeting

The Helmholtz-Zentrum in Munich, Germany kindly agreed to host the next WG3 meeting during the week beginning 4 October 2010.

Annex A: Steps in the Proposed Work Plan

Step 1: Process orientated consideration of critical factors that may have a major influence on dose to man

Here the idea is to identify the processes using our radioecological and assessment experience to identify important processes, based on existing work in BIOMASS, BIOPROTA, BIOMOSA and the national assessment projects which have been ongoing, notably concerning:

— Climatic factors and climate change processes;
— Geosphere-biosphere interface processes;
— Geomorphological processes; and
— Land use processes.

and then:

— Determination of whether these factors are of a more universal nature or are they specific to a site; and
— Consideration of whether models developed for one climate (e.g., temperate) are adequate to address the specific conditions of a changed climate.

Step 2: Learning from recent assessments and research

A study of how recent assessments and related research have addressed critical issues will provide practical examples of how issues have been addressed. Those assessments will have had specific contexts attached to them (as discussed in IAEA-BIOMASS-6, etc.), so it will be instructive to identify the assessment approaches used and to consider how they need to be different in those different contexts, or whether in fact common solutions can be effective.

Participants may wish to propose particular assessments and research work for consideration.

Step 3: Quantitative analysis of alternative approaches

It is anticipated that the work in Steps 1 and 2 above will throw up potentially important questions which can be examined though applying alternative modelling approaches. Scenarios related to these questions can be constructed and different methods for their analysis applied or developed. Participants may already have such questions and proposals for their examination, as discussed during the Second WG3 Meeting in January 2009 in relation to the geosphere-biosphere interface, and these are certainly invited for consideration.

Step 4: Development of contributions to recommendations on biosphere assessment, models and data

The results from Steps 1–3 above can be used to address questions such as:

— Are the basic steps in the IAEA-BIOMASS-6 methodology still relevant?

— What detailed improvements may be made in each step to support future biosphere assessments for repositories, relevant to:
  - specific ecosystems and their site specific data;
  - specific climate systems and climate changes;
  - specific geosphere-biosphere interfaces, in constant conditions and under environmental changes/transitions;
  - the selection and justification of model discretisation;
  - the assumptions for reference groups and food habits;
  - specific land use assumptions; and
  - specific regulatory requirements?