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

EMRAS II
Reference Approaches for Biota Assessment
Working Group 4
"Biota Modelling"

M I N U T E S

of the Third WG4 Meeting held at IAEA Headquarters, Vienna
25–29 January 2010
(during the Second EMRAS II Technical Meeting)

IAEA Scientific Secretary	Working Group Leader
Mr Sergey Fesenko ***(FS)*** Radioecologist, Chemistry Unit, NAEL International Atomic Energy Agency Laboratories A-2444 SEIBERSDORF AUSTRIA Tel: +43 (1) 2600-28247 Fax: +43 (1) 2600-28222 Email: S.Fesenko@iaea.org	Mr Nicholas A. Beresford ***(NAB)*** Radioecologist, Radioecology Group Centre for Ecology & Hydrology (CEH) Lancaster Environment Centre, LEC Building Library Avenue, Lancaster University BAILRIGG, LANCASTER LA1 4AP UNITED KINGDOM Tel: +44 (1524) 595-856 Fax: +44 (1524) 61536 Email: nab@ceh.ac.uk

Attending	
Name / Initials* / Email	**Organization / Country**
Mr Pal Anderson ***(PA)*** (pal.andersson@ssm.se)	Swedish radiation Safety Authority (SSM), SWEDEN
Ms Karine Beaugelin-Seiller ***(KBS)*** (karine.beaugelin@irsn.fr)	Institut de Radioprotection et de Sûreté Nucléaire (IRSN), FRANCE
Mr Yong Ho Choi ***(YHC)*** (yhchoi1@kaeri.re.kr)	Korea Atomic Energy Research Institute (KAERI), REPUBLIC OF KOREA
Mr Paul Dale ***(PD)*** (paul.dale@sepa.org.uk)	Scottish Environmental Protection Agency (SEPA), Scotland, UK
Mr Che Doering ***(CD)*** (che.doering@arpansa.gov.au)	Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), AUSTRALIA
Mr Jan Horyna ***(JH)*** (jan.horyna@sujb.cz)	State Office for Nuclear Safety (SÚJB), CZECH REPUBLIC
Mr Ali Hosseini ***(AH)*** (Ali.Hosseini@nrpa.no)	Norwegian Radiation Protection Authority (NRPA), NORWAY
Ms Brenda J. Howard ***(BJH)*** (bjho@ceh.ac.uk)	Centre for Ecology & Hydrology (CEH), UK
Ms Tarja Ikaheimonen ***(TI)*** (tarja.ikaheimonen@stuk.fi)	Radiation and Nuclear Safety Authority (STUK), FINLAND
Mr Matt Johansen ***(MJ)*** (mjo@ansto.gov.au)	Australian Nuclear Science & Technology Organisation (ANSTO), AUSTRALIA
Mr Isao Kawaguchi ***(IK)*** (kawag@nirs.go.jp)	National Institute of Radiological Sciences (NIRS), JAPAN
Ms Katerina Maroudi ***(KM)*** (katerinamar@hotmail.com)	National Center of Scientific Research "Demokritos", (NCSR"D"), GREECE
Mr Steve Mihok (SM) (steve.mihok@cnsc-ccsn.gc.ca)	Canadian Nuclear Safety Commission (CNSC), Canada

*Initials used to refer to participants within minutes and actions as appropriate.

Attending	
Name / Initials* / Email	**Organization / Country**
Mr Geert Olyslaegers ***(GO)*** (golyslae@sckcen.be)	Studiezentrum für Kernenergie (SCK/CEN), BELGIUM
Ms Iisa Outola ***(IO)*** (iisa.outola@stuk.fi)	Radiation and Nuclear Safety Authority (STUK), FINLAND
Ms Maria Psaltaki ***(MP)*** (ramps11@hotmail.com)	National Technical University of Athens (NTUA), GREECE
Mr Abou Bakr Ramadan ***(ABR)*** (ramadan58@yahoo.com)	National Center for Nuclear Safety, EGYPT
Ms Synnöve Sundell-Bergman ***(SSB)*** (synnove.bergman@vattenfall.com)	Vattenfall Power Consultant AB, SWEDEN
Ms Keiko Tagami ***(KT)*** (k_tagami@nirs.go.jp)	National Institute of Radiological Sciences (NIRS), JAPAN
Mr Shigeo Uchida ***(SU)*** (s_uchida@nirs.go.jp)	National Institute of Radiological Sciences (NIRS), JAPAN
Ms Hildegarde Vandenhove ***(HV)*** (hvandenh@sckcen.be)	Studiezentrum für Kernenergie (SCK/CEN), BELGIUM
Ms Christine Willrodt ***(CW)*** (cwillrodt@bfs.de)	Bundesamt für Strahlenschutz (BfS), GERMANY
Mr Michael D. Wood ***(MDW)*** (mwood@liv.ac.uk)	Sustainable Water Integrated Management & Ecosystem Research (SWIMMER), UK
Ms Tamara L. Yankovich ***(TLY)*** (tamara.yankovich@areva.ca)	AREVA Resources Canada, CANADA
Mr Satoshi Yoshida ***(SY)*** (s_yoshida@nirs.go.jp)	National Institute of Radiological Sciences (NIRS), JAPAN
Mr Charley Yu ***(CY)*** (cyu@anl.gov)	Argonne National Laboratory (ANL), US A

*Initials used to refer to participants within minutes and actions as appropriate.

Meeting objectives

The objectives of this (the third) meeting of EMRAS II Working Group 4 (WG4) were to review progress and agree the future work programme with regard to:

— Dose rate benchmarking exercise (Exercise 3);
— Beaverlodge Lake scenario;
— Little Forest Burial Ground scenario;
— Possible wetlands scenario;
— Heterogeneous distributions of radionuclides in sediment profiles;
— Screening level assessments; and
— Interaction with WP1 – 'combined assessments'.

Time was also allowed within the agenda to demonstrate the additional functionality of the recent release of RESRAD-Biota (by ***CY***) and Rn-222 studies in the UK (by ***NAB***); these are not summarised below.

NOTE: With regard to all of the remaining scenario applications, it was agreed that inputs would be coordinated and focussed in order to avoid multiple repetition of a given methodology, ensure available methodologies are used and avoid inappropriate application of methodologies. Where possible, probabilistic outputs will be requested.

Next meetings

The dates and location of the next (fourth) WG4 Meeting have now been agreed and the meeting will be held at IAEA Headquarters in Vienna, 6–9 September 2010 as part of a Joint Working Group

Meeting with both Working Group 5 (WG5) "Wildlife Transfer Coefficient Handbook" and Working Group 6 (WG6) "Biota Dose Effects Modelling".

The dates of the next (third) EMRAS II Technical Meeting were announced during one of the Plenary Sessions, i.e., IAEA Headquarters in Vienna, 24–28 January 2011.

Actions regarding 2010 interim meeting:

Action	Responsible	Due Date	Status
Agree data and venue	NAB/BJH/Tom Hinton/SF	07/02/2010	Ongoing!
Notify NAB of availability for the three identified weeks	All	19/02/1010	Will re-circulate dates

WG4 publications updates

(1) The paper on the Chernobyl scenario is now in-press in J. Radiological Protection:

Beresford, N.A., Barnett, C.L., Brown, J.E., Cheng, J-J., Copplestone, D., Gaschak, S., Hosseini, A., Howard, B.J., Kamboj, S., Nedveckaite, T., Olyslaegers, G., Smith, J.T., Vives I Batlle, J., Vives-Lynch, S., Yu, C. Predicting the radiation exposure of terrestrial wildlife in the Chernobyl exclusion zone: an international comparison of approaches. *J. Radiological Prot.*

(2) Referees comments received on the Perch Lake paper were addressed during this meeting:

Yankovich, T.L., Vives i Batlle, J., Vives-Lynch, S., Beresford, N.A., Barnett, C.L., Beaugelin-Seiller, K., Brown, J.E., Cheng, J-J., Copplestone, D., Heling, R., Hosseini, A., Howard, B.J., Kryshev, A.I., Nedveckaite, T., Smith, J.T., Wood, M.D. International model validation exercise on radionuclide transfer and doses to freshwater biota. *J. Radiological Prot.*

(3) The formatted/pre-publication version of the report (TECDOC) from the Biota Working Group, of the first phase of EMRAS (WG1 of Theme 3) can be found on:

http://www-ns.iaea.org/downloads/rw/projects/emras/final-reports/biota-final.pdf

Exercise 3

Fifteen sets of results were submitted to this exercise (to compare dose estimates under simplistic scenarios). Runs have included inputs by model developers who have gone back to the original code to derive values and inputs by model 'users' applying default options. Values from the ICRP *Reference and Animal Plants* report were also included.

Jordi Vives i Batlle[#] (***JVB***) has conducted an analyses of the inputs whilst ***NAB*** has compared inputs using variants of the same approach (e.g., two runs using the RESRAD-BIOTA methodology). ***NAB*** presented the results of this analyses on behalf of ***JVB***.

On the most part, inputs by the different models were similar. A few outliers were identified and participants will be contacted to explain these over the next two weeks. Participants are requested to respond promptly.

JVB has begun to draft a paper on the exercise to submit to *Radiat. Environ. Biophysics* which accepts electronic archives (enabling the inputs to be made available to readers). It is hoped that the paper will be submitted by the end of April 2010.

WG4 thanks ***JVB*** and Sandra Vives Lynch[#] (***SVL***) for their efforts in analysing the data inputs.

[#] Unable to attend this meeting.

Actions related to Exercise 3:

Action	Responsible	Due Date	Status
Identify outliers and discuss with participants	JVB/NAB/participants as contacted	21/02/10	Started
Check and revise fish egg predictions	MJ	21/02/10	Done
Send (GO) DosDiMEco results	NAB	29/01/10	Done
Check DosDiMEco results	GO	21/02/10	Done
Circulate draft manuscript for comment	JVB	20/03/10	
Comment on draft manuscript	All participants	2 weeks after receiving	

Beaverlodge Lake scenario

SM presented an overview of the results submitted to Phase 1 of the scenario – predicted activity concentrations in fish and invertebrates. Twelve sets of results have been received to date. Predicted activity concentrations varied widely and a number of modellers over-predicted the observed fish activity concentrations by orders of magnitude.

The discussion focussed on: (i) understanding the results obtained so far; and (ii) planning the future objectives of this scenario. It was agreed that the scenario would focus on those sites for which either fish data are available and in addition any site(s) of especial interest to CNSC. The following activities were agreed upon:

(1) Allow participants limited time to check/confirm or make new inputs to Phase 1 (focused to the limited number of sites);
(2) Calculate appropriate CR values from the Canadian mining industry transfer data being compiled for WG5;
(3) Phase 2 – participants will be requested to determine dose rates to freshwater organisms at the selected sites. Where possible probabilistic dose rates will be estimated;
(4) Dose rates to be put into context with available benchmark values during next (fourth) WG4 Meeting (6–9 September 2010); and
(5) Provide results to WG6 for interpretation/comment.

Actions associated with the Beaverlodge scenario:

Action	Responsible	Due Date	Status
Agree date for checking/revising Phase 1 inputs	NAB/Richard Goulet (RG)	05/02/10	
Confirm that no inputs are LoD values	SM	14/02/2010	Done (one Th-230 may need correction; some chemicals were LoD values)
Provide revised Phase 1 spreadsheet to participants	RG	TBC	
Check/revise/provide Phase 1 results	All participants	TBC	
Prepare draft of Phase 2 instructions/results spreadsheet	RG	01/03/10	

Action	Responsible	Due Date	Status
Register interest in Phase 2 stating methodology to be used	All participants	01/03/10	
Submit Phase 2 results	All participants	31/05/2010	
Present results summary at summer workshop	RG	TBC	

Little Forest Burial Ground

MJ presented the draft Little Forest Burial Ground scenario. Objectives, approaches and (biota activity concentration) data availability were discussed. The scenario instructions will be refined a results spreadsheet made available for submission of results before the next WG4 meeting.

Actions related to Little Forest Burial Ground scenario:

Action	Responsible	Due Date	Status
Register interest in scenario stating methodology to be used	All participants	01/03/2010	
Agree scenario and results spreadsheet	MJ (lead)	01/03/2010	Second draft with NAB for comment
Submit results	All participants	31/05/2010	
Present results summary at summer workshop	ANSTO	TBC	

Wetland scenario

TY and ***MW*** presented possible data sources for a wetlands scenario on behalf of Karolina Stark[#] (***KS***) of the University of Stockholm, Sweden. The group agreed that there was now sufficient data to take this scenario forward. The draft scenario will be presented at the summer meeting.

Action related to wetland scenario:

Action	Responsible	Due Date	Status
Prepare draft scenario for presentation/agreement at summer workshop	KS (with assistance from TY, MW & NAB)	End June 2010	

Heterogeneous distributions of radionuclides in sediment profiles

KBS and ***AH*** presented an update on their activities to consider how to model doses to biota as a consequence of highly heterogeneous distributions of radionuclides often observed in soil/[♣]sediment profiles (specifically examples of TENORM radionuclides in sediment profiles as provided by CNSC). There are still some significant differences between the outputs of the two models (EDEN and EPIC-DOSES3D) which require investigation (including the underlying nuclide libraries).

[#] Unable to attend this meeting.

[♣] Indicates the name of the presentation given on the WG4 web page (http://www-ns.iaea.org/projects/emras/emras2/working-groups/working-group-four.htm). This presentation is not mentioned in the Agenda (see below) as it was added to the programme after the Agenda was issued.

Actions for heterogeneous distribution assessment:

Action	Responsible	Due Date	Status
Investigate reason for variation between models	KBS/AH	End June 2010	
Report progress to group	KBS/AH	TBC	

Screening level assessments

Neither the WG4 nor the preceding Biota Working Group, of the first phase of EMRAS (WG1 of Theme 3) have considered the relative performance of the available models when used in initial screening level/tier assessments. However, it is envisaged that most regulated sites will only require this level of assessment (i.e., they will be 'screened out' from the need for more detailed assessment). Initial ♣screening assessments are intended to be conservative and have the objective to identify sites of negligible concern and to remove them from further consideration with a high degree of confidence. ***NAB*** presented a comparison of screening assessment outputs of three freely available models. The outputs of the models varied considerably in terms of estimated risk quotient (by orders of magnitude) and the radionuclide-organism combinations identified as being the most limiting. A number of factors contribute to the variability: transfer parameters (CR and Kd) values used; organisms considered; different input options and how these are utilised in the assessment; assumptions with regard to secular equilibrium; geometry and exposure scenario.

WG4 agreed that it should better document and understand the differences in screening level outputs, especially as more screening assessment approaches are being proposed. However, it was decided that this would largely be put on hold until after the finalisation of the 'Wildlife Transfer Handbook' which may result in some methodologies changing their parameter values.

Actions related to screening tier assessments:

Action	Responsible	Due Date	Status
Provide details of any screen level methodologies (other than ERICA, RESRAD, R&D128) to NAB	All	31/05/2010	
Propose workplan at summer 2010 workshop	NAB	TBC	

Combined assessments

During the First EMRAS II Technical Meeting, held at IAEA Headquarters in Vienna, 19–23 January 2009, David Copplestone[#] (***DC***) was requested by the Steering Committee to consider the possibility of cross cutting activities to demonstrate/develop combined approaches to assess both humans and wildlife. Collaboration with WG1 in scenarios they have proposed may offer the opportunity to pursue this objective. Trevor Stocki (***TS***) (WG1 Leader) gave an overview of the first two scenarios that WG1 are considering. There was general agreement that it would be beneficial to pursue collaboration and ***TS*** will liaise with ***NAB/DC*** to determine the needs of WG4 within scenario descriptions and agree objectives of collaboration.

♣ Indicates the name of the presentation given on the WG4 web page (http://www-ns.iaea.org/projects/emras/emras2/working-groups/working-group-four.htm). This presentation is not mentioned in the Agenda (see below) as it was added to the programme after the Agenda was issued.

[#] Unable to attend this meeting.

WG4 MEETING AGENDA		
Monday, 25 January 2010		
09:30–13:00	Plenary Session	
13:00–14:00	***LUNCH BREAK***	
13:00–17:30	Attendance at other Working Group Meetings (including WG5 'Wildlife Transfer')	

Tuesday, 26 January 2010		
09:00–09:20	Welcome, agree agenda and meeting objectives, review outstanding actions	Nick Beresford, WGL (CEH, UK)
09:20–09:30	Exercise 3 – ♣update	
09:30–09:45	Methodology used by ♣VIC (new participant)	Susumu Ryufuku (VIC, Japan) #
09:45–10:00	R&D128 ♣analogue approach	David Copplestone (EA, UK) #
10:00–10:45	Analyses of ♣results, paper status and final planning	Nick Beresford, WGL (CEH, UK)
10:45–11:15	***COFFEE BREAK***	
11:15–11:35	Beaverlodge – ♣overview of activities to date	Steve Mihok (CNSC, Canada)
11:35–12:30	Description of approaches used to input results to Beaverlodge scenario (15 minutes per participant)	1. Ali Hosseini (♣NRPA, Norway) 2. David Copplestone (♣EA, UK) # 3. Mat Johansen (♣ANSTO, Australia) 4. Hildegarde Vandenhove (♣SCK/CEN, Belgium)
12:30–13:30	***LUNCH BREAK***	
13:30–14:15	Description of approaches used to input results to Beaverlodge scenario (15 minutes per participant) – continued ...	5. Katerina Maroudi ("♣Demokritos", Greece) 6. Keum Dong-Kwon (♣KAERI, Rep. of Korea) # 7. Jan Horyna (♣SÚJB, Czech Rep.) 8. Charley Yu (♣ANL, USA) 9. Nick Beresford (♣CEH, UK) 10. Mike Wood (♣UoL, UK)
14:15–15:15	Summary of result	Steve Mihok (CNSC, Canada)
15:15–15:30	***COFFEE BREAK***	
15:30–16:15	Beaverlodge – planning and future objectives	Steve Mihok (CNSC, Canada) Nick Beresford, WGL (CEH, UK)
16:15	Meeting close	

Wednesday, 27 January 2010		
09:00–12:00	Plenary Session	
12:00–13:00	***LUNCH BREAK***	
13:00–14:00	Presentation of ♣Little Forest scenario: agree objectives and timetable	Mat Johansen (ANSTO, Australia)
14:00–14:45	Suggestions for a ♣wetlands scenario	Tamara Yankovich (Areva, Canada)
14:45–15:00	***COFFEE BREAK***	
15:00–16:00	Interactions with other WGs – opportunities for combined assessments?	David Copplestone (EA, UK)/ Trevor Stocki (WG1 Leader)
	Science updates	
16:00–16:20	RESRAD-BIOTA V.1.5 – demonstration	Charley Yu (ANL, USA)
16:20–16:40	Rn dosimetry♥	David Copplestone (EA, UK)
16:40–16:50	Rn field studies♠	Nick Beresford (CEH, UK)
16:50–17:00	AoB and actions round-up	
17:00	Meeting close	

Thursday, 28 January 2010	
13:00–17:30	Attendance at other Working Group Meetings (including WG5)

Friday, 29 January 2010	
09:00–13:00	Plenary Session

♣ Indicates the name of the presentation given on the WG4 web page (http://www-ns.iaea.org/projects/emras/emras2/working-groups/working-group-four.htm)

Not present at this meeting, presentation given by either ***NAB*** or ***MDW***.

♠ Presentation is unavailable due to the provisional nature of the results.

♥ Not presented.