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

EMRAS II
Reference Approaches for Human Dose Assessment
Working Group 1
Reference Methodologies for "Controlling Discharges" of Routine Releases

M I N U T E S

of the Sixth Meeting held at McMaster University, Hamilton, Ontario, CANADA
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IAEA Scientific Secretary	Working Group Leader
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*Initials used to refer to participants within minutes and actions as appropriate.

♠Unable to attend due to other commitments.

Introduction

Firstly, Working Group 1 (WG1) would like to thank McMaster University and Ms Carmel Mothersill for providing the meeting room, refreshments and a graduate student who assisted by guiding participants from the Hotel to the meeting room on the first day of the meetings.

TS welcomed everyone, including new participants, and gave a presentation about WG1's progress and the EMRAS II project entitled 'Reference Methodologies for "♣Controlling Discharges" of Routine Releases'. This was the same presentation which ***TS*** gave during the ICRER 2011 Conference.

Scenario C

TS gave a presentation on the preliminary results of the Chalk River Scenario, noting that there were some large discrepancies between modellers. ***TS*** also presented the activity concentrations in the water, so that could also be compared. Unlike the marine release, the differences in concentrations did not explain the differences.

The results submitted by ♠Justin Smith, UK ***(JS);*** ♠Dejanira da Costa Lauria, Brazil ***(DCL)***; ♠Pawel Krajewski, Poland ***(PK)*** and ♠Laura Newsome, UK ***(LN)***, were a few orders of magnitude higher than the results of ***CM***, ***YB*** and ***AC*** (for ♠Valeria Amado, Argentina ***(VA)***). Note: ***AC/VA's*** results were different than ***JS's*** results because they used Dosis liquidas program and PC CREAM 08, respectively.

Some questions were raised:

— Did ***LN*** model the marine release? (***TS*** checked later and the answer was no).
— Did ***JS*** run the simple model? Or the multibox?

The following questions need to be answered by the group:

— Which model type was used?
— Where did they measure the concentration in their model? Was it at Harrington Bay or Westmeath?
— Did they use filtered or unfiltered water?

Participants with an activity concentration greater than 49 Bq/m^3 should recheck their work. (These questions were circulated to all WG1 members during the meeting).

The group worked on understanding the differences by using a spread sheet, with some check calculations.

With regard to the order of magnitude differences, ***YB*** suggested that it could be a problem with the units being used.

TS entered the results into a spread sheet and the participants carried out some check calculations. The group discussed the drinking water pathway and compared it with the modelled results. By using a simple check calculation it was found that the maximum concentration activity could be 48.8 Bq/m^3. This number was obtained with the 1 TBq/year release rate and the output rate of 650 m^3/s. Therefore, the concentrations could not be higher than this value.

With regard to Co-60, participants compared the results for each modeller in this pathway by simply carrying out a hand calculation in xls. The group took the total water in L/year and converted it to m^3/year. Using each participants' concentration in water, the total water (in L/year), and the dose coefficient (the same for everyone at 3.4×10^{-9}) participants found that all of the results agreed within a factor of 10, except for ***LN's*** result. Her inputs were off, which could be due to a unit conversion issue. After correcting for this issue, her results, however, were reasonable.

♣ Indicates the name of the presentation given on the WG1 web page (http://www-ns.iaea.org/projects/emras/emras2/working-groups/working-group-one.asp?s=8).

♠ Unable to attend due to other commitments.

The group also found that ***PK's*** and ***DCL's*** (♣Brazil-CROM) results for this pathway were off by the units of conversion and that would explain a factor of 10^3 for this pathway.

Participants noticed that the external dose rate from sediment for Co-60 was a very significant component in the large difference between the results.

The group then tried to compare the results of another pathway, namely the dose from swimming. It was found that the activity concentration in sediment changed by a factor of 10 between participants.

It was clear that discussions were needed with the participants who were not present, in order to understand what they had done.

TS sent an email to other (absent) WG1 members to discuss the findings so far, including the questions noted above. Unfortunately, as the meeting was held on a weekend, there were no responses (reasonably so). ***TS*** included the spread sheet for checking the results.

Final report

The group began the second day of the meeting by discussing the final report. ***TS*** had sent a very preliminary draft to all WG1 members about 1 week earlier.

AC said that she needed to add the Dosis Líquidas program.

Each participant will need to add a description of the river portion of their models.

For the description of the models, ***TS*** gathered the ones he had received so far. If a detailed description was not provided, then ***TS*** took the description from the paper as a place holder.

PK included a figure in his description of the model he was using and ***TS*** included it in the report for discussion. It was pointed out that the figure was specific to that particular model and that not all models were the same. Therefore, if the group were to use a pathway model figure, they would need to use a high level figure which was common to all models and could therefore not use a specific figure. This was to avoid confusion, i.e., one could think that all models were exactly the same as the figure, which would not be true.

It was suggested that the scenarios could be described with a figure.

The goals of the project were to describe the results of tools and to find sources of differences and report on them.

The group went through the timeline document and the first draft and added comments to these two documents.

For the future work section, it was decided that, for now, not to put this into the report but to email these topics to the IAEA instead and to double check this with ***DMT***. ***TS*** sent these suggestions to the IAEA after the meeting and they were incorporated into the IAEA's EMRAS II Follow-up Programme Questionnaire that was sent out to gather information regarding the next programme♦.

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♦ UPDATE: Since this meeting was held it was announced that the follow-up programme to EMRAS II – "MODARIA" MOdelling and DAta for Radiological Impact Assessments) – will run for 4 years (2012–2015) and the first Technical Meeting will take place at IAEA headquarters in Vienna, 19–22 November 2012.

With regard to the critical group section of the report, the participants were impressed with ***JS's*** contribution. It was decided that, as a minimum, participants should at least write up answers to ♠Viktoryia Kliaus's (of Belarus ***(VK)***) questions in the form of paragraphs, or if possible they could provide the same level of detail as ***JS's*** section.

As the report was discussed, ***TS*** made changes to the draft report document. Furthermore, the following questions/requests are raised by participants:

— Check whether the results of the original questionnaire are included in the report.
— Check whether the results of the critical group questions are included in the report.

It was also decided that, should they wish to do so, participants can still send results of the original questionnaire via email to ♠Anna Maria Blixt Buhr (of Sweden ***(AMBB)***; email: annamaria.blixtbuhr@vattenfall.com), copying ***TS***.

Analysis of the data was also discussed and it was decided that ***TS*** will need to send out a new version of the template asking the questions in columns, i.e.:

— Can you change the parameter? Y/N?
— Was the scenario parameter used? Y/N?

Participants will have to document their additional parameters, and if there are a few, they should make a list for the report. If there is a large number of parameters, they could write an explanation and give a reference.

It was agreed that all the graphs and their corresponding tables will be included in the report.

Return of discussions to Scenario C

It was pointed out that the side of the river that the group are considering has an effect.

The complete mixing distance is before Harrington Bay (if SRS-19 is used).

One participant found that if you are on the opposite side to the release and closer to the facility, the concentration is lower than if you were on the same side (according to SRS-19).

Participants therefore need to be asked:

— Where their complete mixing distance is?
— Where they take the water from? In the plume, or not?
— How far from the plume axis do they take their water?

The main questions are: Do we need to make a decision for the location? And for mixing?

One of the points brought up during the meeting was: Should we keep Westmeath? The group decided to keep it. One explanation is that the group could compare something else and would be confident (everything agrees) but wrong when calculating the same thing. If the model results agree then that is good, if not, it means more research is required in this area.

For example, one can explain the difference seen with ***YB's*** drinking water results. The group simply needs to explain in more detail. In other words, the drinking water that ***YB*** calculated is not as important because it is taken from a location which is before complete mixing. That then means the ingestion of foods is more prevalent.

CM and ***YB*** discussed activity concentrations in water.

♠ Unable to attend due to other commitments.

A check was carried out for immersion in surface water. There was a L to m^3 problem – ***PK's*** results are exactly 1000 off. Others are more than 1000. It is therefore essential to request that everyone check their conversions from L to m^3.

Some checks were then carried out for the Sr-90 dose coefficient from water immersion. The value is zero in N288.1, but ♠Lauren Bergman (of Canada ***(LB)***) had put a value of 3.44E-9 Sv/a per Bq/L. ***YB*** mentioned that he would like to use the value for Sr-90 which includes daughter products.

A question to the participants is: Did they use dose coefficient for Sr + daughter or just Sr?

Also, where did ***LB*** get 3.44E-9 from?

Flow rate for liquid effluent was 650 m^3/s, the mean river flow rate was 840 m^3/s. ***YB*** had a question: 70% – Do we need it?

CM answered yes, that it is needed for partial mixing.

A question to the participants is: Whether they used flow rate for liquid effluent?

Iodine from Scenario A

TS tried to compare the responses from the questions about the modelling of Iodine in scenario A. This was difficult as not all the responses were available.

CM mentioned that participants were free to choose what they wished as feed for cows, that is therefore a part of the reason why participants had different results. For example, if a person uses different material for food they will have different concentrations, i.e., the dry weight vs. fresh weight. ***CM*** said this can be a factor of 9. There is a trap, if the 16 kg was dry weight instead of fresh weight.

YB and ***CM*** are consistent for the dose to cow's milk.

It was decided to change the scenario description so that participants were more consistent in their modelling. Basically participants are using Westmeath for animal food and Harrington Bay for everything else. The group needs to double check for inconsistencies.

More to do lists

1. Ask participants to rewrite their critical group section:
   (a) Minimum is to write their responses to ***VK's*** questions in paragraph format.
   (b) If possible, include the answers ***VK's*** questions and include as much detail as ***JS's*** example.
2. ***TS*** is to write a script to generate tables of results and fix the graphs for Chalk River. (Done).
3. Add ***YB's*** results to the atmospheric results.
4. ***TS*** to send out xls for the parameter sheets where the person can answer the questions used parameter or not? Can change parameters or not?
5. ***TS*** to find ***CM's*** email with respect to Iodine.
6. ***TS*** to find the email with respect to scenario C.

♠ Unable to attend due to other commitments.

Final day of the meeting

Later in the year, perhaps in autumn 2011, the group might hold a teleconference if it is deemed necessary. The idea is to have the teleconference at this time: 8 am Ottawa, which is 9 am in Argentina, which is 2 pm in France, and 3 pm in Kiev. ***TS*** has a teleconference number, but it might be expensive for some participants, so Skype may be used instead.

Deadlines

TS to send out the Tables and Parameters sheet to all participants who modelled. ***TS*** and ***AC*** will analyse the results by the dominate path way and these will circulated to WG1 members.

Ask every participant to check the tables.

Send out tables (and send parameter sheets to ***AC***).

Deadline for analysis is the beginning of September 2011.

Deadline for critical group work is 1 September 2011.

Ask participants to answer the questions (use parameter Y/N) and (could change it Y/N) if not which value? Deadline one month from sheet being sent out.

Deadline for participant check tables, 2 weeks after they are sent out.

To have the full report completed by the end of November 2011. Deadlines for writing sections is therefore October 2011.

Ask ***DMT*** if the group will carry out an analysis of the critical groups, or just descriptions?

Ask ***DMT*** if he received some other questionnaires?

Send future work list to the IAEA. (Done).

Publications

The group could publish the results of scenario C in a paper. ***RH*** found a publication in *Science of Total Environment* where models were compared to each other, perhaps we could publish there. The group could see if it could obtain the concentration in the river from David Rown (presentation at Chalk River) to compare our models to. Publishing in JER is also a possibility.

Comparison to measured data

CM commented that it is a lot of work to compare the models to real measured data and he remarked that one needs to carry out a very good validation, because one could make mistakes and omit things.

Furthermore, for screening models we don't have to do this. For some reason, phosphate discharges and non-nuclear facilities were mentioned.

If one has conservative values, that is acceptable from some generic values.

Finally, the group broke into informal discussions about how the critical group is chosen and other scientific issues.